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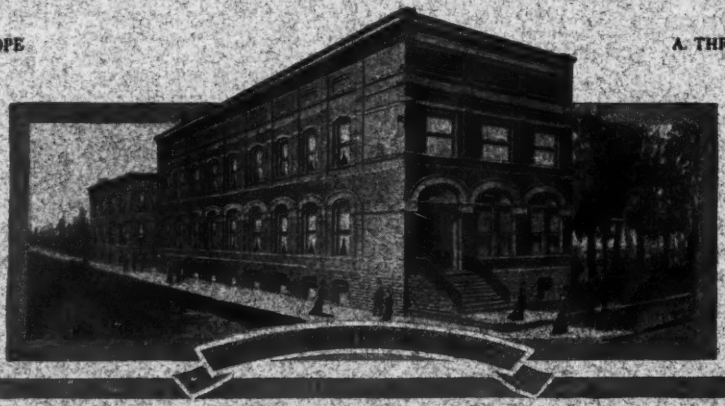

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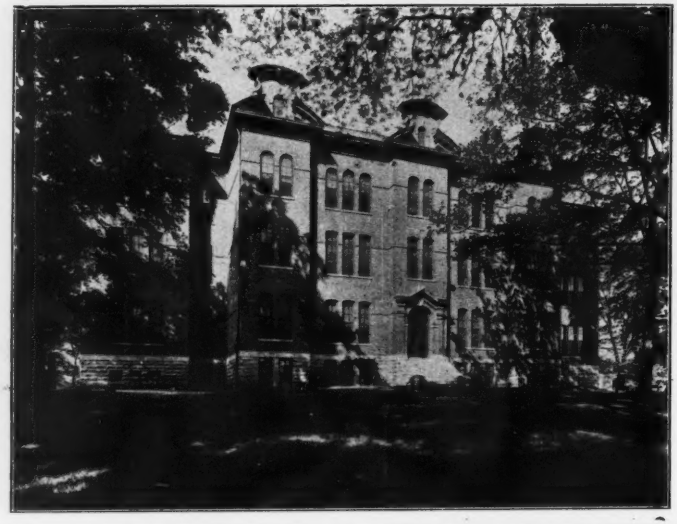

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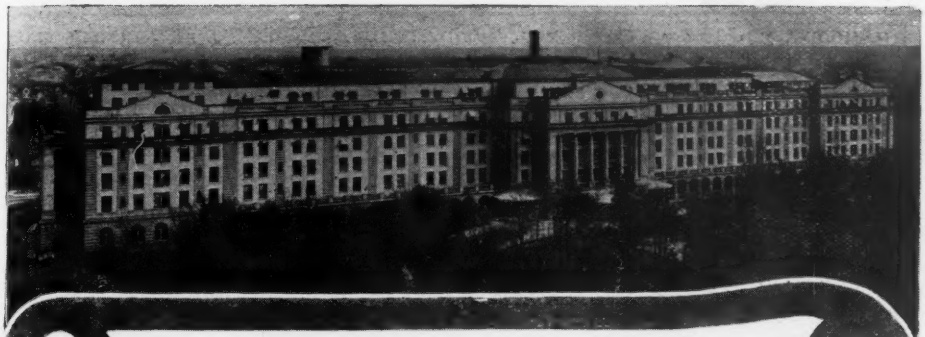

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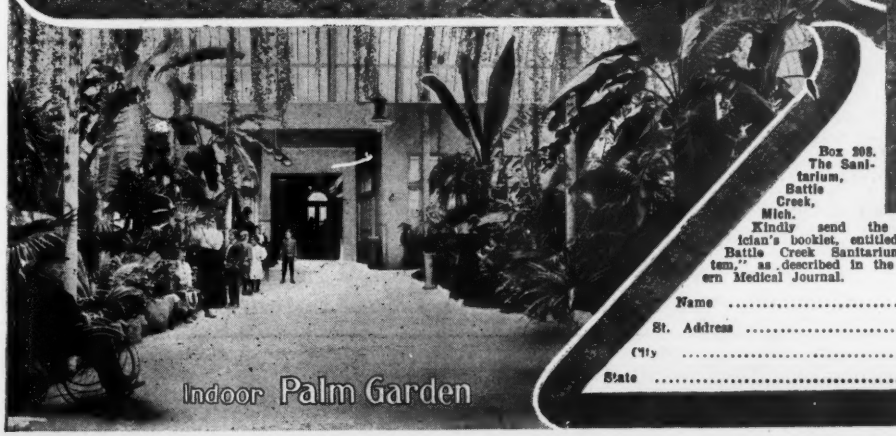

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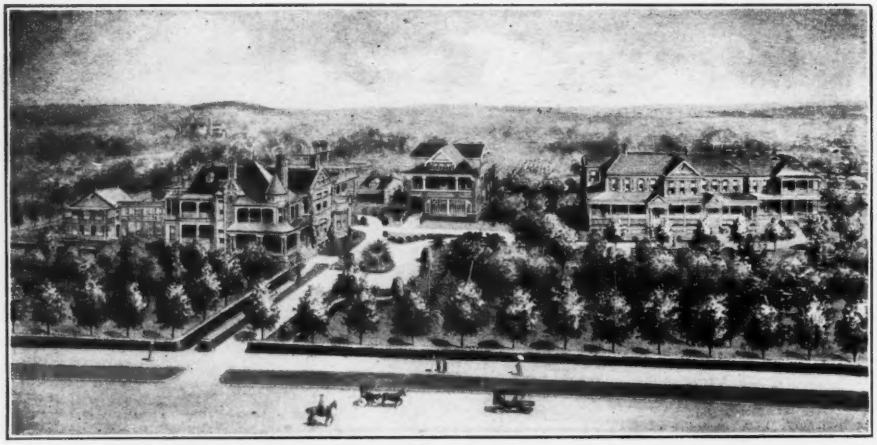

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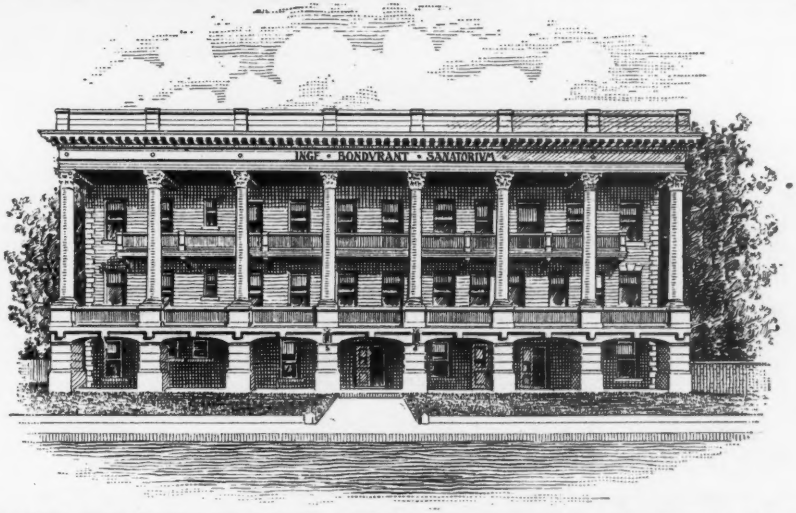

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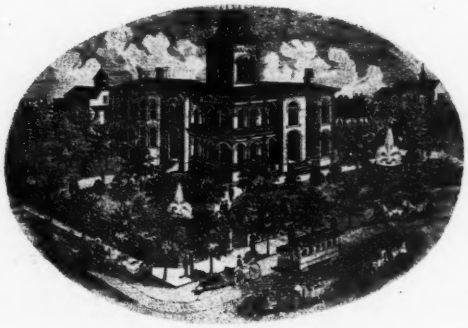

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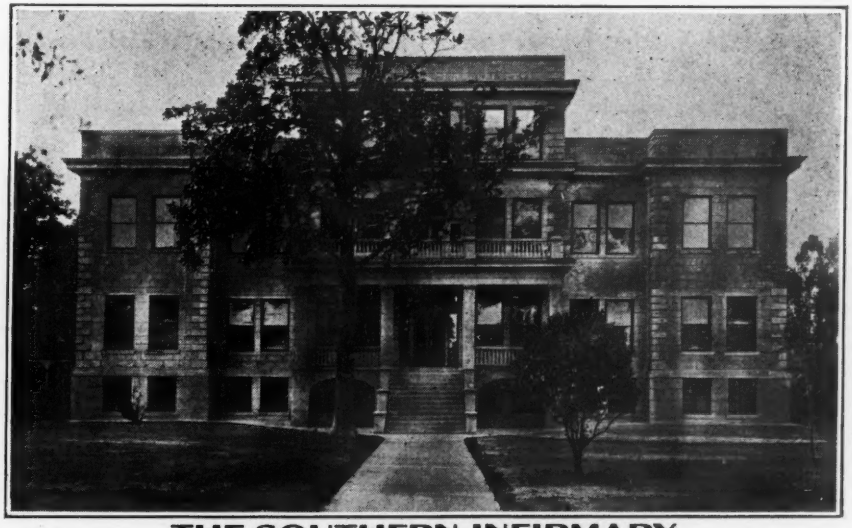

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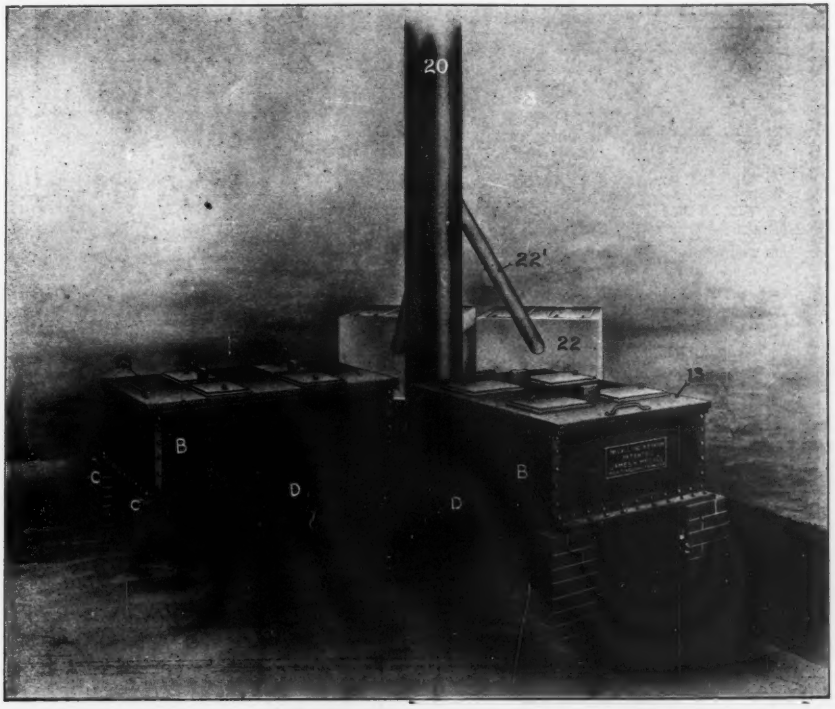

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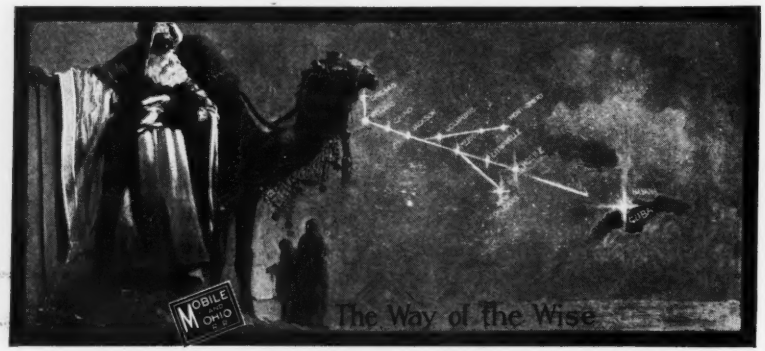

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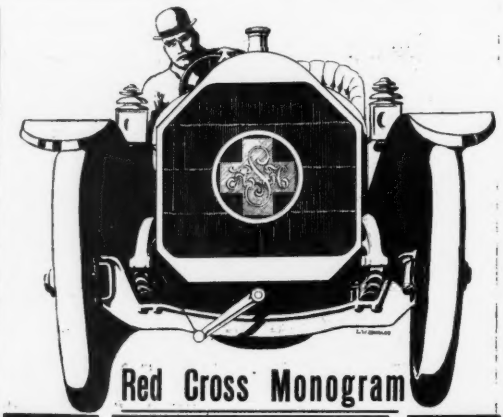

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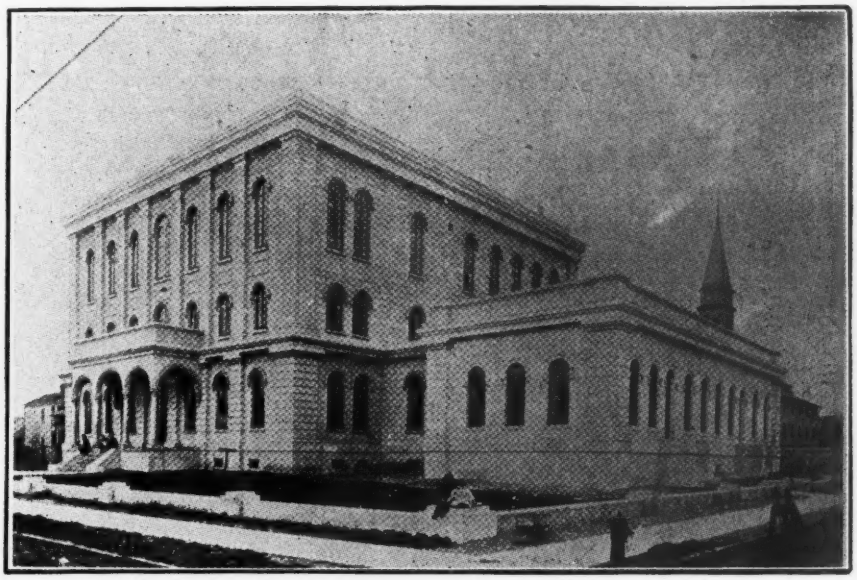

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SOUTHERN MEDICAL JOURNAL

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ORIGINAL ARTICLES

FIRST INSTALLMENT OF EXTENSIVE ABSTRACTS FROM

"FACTORS IN THE TRANSMISSION AND PREVENTION OF MALARIA IN THE PANAMA CANAL ZONE."

By S. T. DARLING, M.D.

From a Reprint Issued by the Liverpool School of Tropical Medicine.

THE JOURNAL regrets that lack of space forbids the reproduction of this excellent article entire.

The record is extensive and complete, and the excerpts that follow show the high character of the work.

In the "Introduction" the author speaks of the importance to dwellers in a malarial region, of being able to recognize "the species of Anophelines hospitable to malaria, and those transmitting it." Of the breeding habits of Anophelines he says they are as choice in their selections of breeding places as are fishes in choosing their feeding places, some forms refusing to utilize pools, damp spots, etc., that are necessary to other forms.

On this account if the breeding conditions necessary for the propagation of the malaria-carrying Anophelines were determined it would be possible to direct all our attention to these and neglect the unmalarial or innocuous Anophelines until the malaria transmitters were abolished. Subjoined is a list of subjects considered in the article:

OUTLINE OF THE SUBJECTS CONSIDERED.

Anophelines of this region.

Collection of larvæ.

Breeding out mosquitos and methods of feeding.

Biting—infecting experiments.

Estimation of gametes.

Care of mosquitos after feeding.

Method of examining for zygotes and sporozoites.

Description of the malarial parasite in the mosquito.

Table of infecting experiments.

Notes and conclusions from table of infecting experiments.

Limit of infectiousness of man.

Notes on the bionomics of Anophelines.

Effect of salt or sea water on larvæ.

Experiments with larvacides.

Experiments with agents destructive to vegetation, grass and algae.

Experiments with screening of verious mesh.

Experiments with screening of various composition, based on practical tests and chemical analyses.

Note on the value of the practice of killing Anophelines found in quarters and barracks.

Effect of quinine upon the parasite in mosquito and man.

The following is a list of Anophelines of the Canal Zone:

Anopheles argyitarsis, R. D.
Anopheles tarsimaculata, Goeldi.
Anopheles gorgasi, D. K.
Anopheles albimanus, Wied.
Anopheles cruzii, D. K.
Anopheles apicmacula, D. K.
Anopheles punctimacula, D. K.
Anopheles malefactor, D. K.
Anopheles eiseni, Coquill.
Anopheles franciscanus. McCrack.
Anopheles pseudopunctipennis, Theob.

The above eleven species of Anophelines

have been collected in the Canal Zone during the past five years. They are not taken, nor do they exist in their breeding places, in anythink like equal numbers. For example: Only one specimen *A. gorgasi* has been found. Of the eleven species, the commonest ones are *A. albimanus, A. pseudopunctipennis* and *A. malefactor,* but this again must be qualified by stating that the predominance of a species varies from season to season and from place to place. In certain villages, upon going through the barracks only *manus* will be found, while in other villages, from 5 to 10 per cent of the mosquitos will be *A. pseudopunctipennis,* and at Ancon during October, 1908, 27 per cent were *A. malefactor* and 72 per cent *A. albimanus.* Mr. a Busck, of the Bureau of Entomology, United States Department of Agriculture, who collected and made observations on Zone mosquitos during 1907, gave it as his opinion that *A. pseudopunctipennis* was the commonest Anopheline during the period of his stay.

The necessities of the canal operations in excavating and filling, change the topography of districts and localities so as sometimes to convert salt marshes into fresh water ponds, or to make tracts of land containing few Anophelines, into a vast swamp in which they luxuriate. On the other hand, swamps and breeding places may be drained or filled in the work of excavation. These factors, among others, influence the number and variety of species in a locality.

The commoner Anophelines of the Canal Zone may be divided into three groups:

(A) The white hind-footed group comprising:

A. argyvitavsis.
A. albimanus.
A. tarsimaculata.

(B) The leg uniformly colored group comprising:

A. pseudopunctipennis.
A. franciscanus.

(C) The spotted leg group comprising:

A. malefactor.
A. apicimacula.

These groups present well-marked differences in the markings of adults, in the breeding habits and anatomical characters of the larvæ, and, as will be shown, they possess varying susceptibilities.

Then follows a minute description of each of the Anophelines mentioned in the list, and which, though very interesting and valuable, we must omit for the present, though the material thus elided may be used hereafter.

After the description comes some intensely interesting matter under various headings, much of which we insert.

COLLECTION OF LARVAE.

In order that a large number of adults could be kept on hand from day to day, it was arranged that sanitary inspectors at the various districts along the Panama Railroad should send bottles containing larvæ and pupæ to the laboratory daily. Special collections of larvæ were also made and excursions to breeding places made from time to time. Upon receiving them at the laboratory, larvæ were transferred to a glass moist jar partly filled with fresh water. Predaceous larvæ, such as drag-on-fly larvæ were removed or killed and the Anopheline larvæ transferred to feeding tanks containing algae and organic debris. These glass breeding tanks were placed on a table in front of a window having an eastern exposure so that they got direct sunlight for a few hours in the morning. The water in the breeding tanks was kept fresh and free from fouling by passing a jet of air through it with a Pacquelin cautery bulb, having a heavy glass perforated tip. This proved to be a very important addition to the technique of breeding out larvæ. For shade and shelter a few *Lemma* plants were placed in the tank. . . .

A very simple and satisfactory method for keeping the breeding tanks fresh and clean and free from decomposition was devised. The principle involved is that of aeration—preventing the development of an anaerobic

condition in the water of the breeding tank by passing a fine jet of air through the water of the tank once or twice a day. . . . The odor arising from the tanks suggested the necessity of aeration to prevent the growth of the anaerobic bacteria. Acting on this suggestion an air jet was devised by attaching a thick glass rod, having a fine capillary central canal to the double bulb of the Pacquelin cautery apparatus and the breeding-out jars aerated for a minute or two morning and evening. The results were highly satisfactory, for the tanks were by this means kept clean and wholesome. The algae remained green and vigorous, the larvæ active and developed rapidly into pupae, the water remained quite clear; in fact, with its floor of sand and clay and a few sprigs of green aquatic plant, such as *Lemma,* it looked as tempting to drink as spring water. The temperature of the water in the tanks ranged between 72° and 84°.

BREEDING OUT—METHODS OF FEEDING.

Pupae were collected in the morning and evening and placed in breeding-out tubes half filled with water and plugged with cotton. Each morning the newly emerged mosquitos were transferred to biting-jars. These biting-jars were modified from those described by Stephens and Christophers. After trying pickle jars and malted milk jars with much impatience, jars made of lantern chimneys were used. These were covered on both ends with crinoline gauze, fastened with a string or a strong rubber band. Inside the jar was placed a circular ring platform of stiff paper, which many of the mosquitos used as a resting place. About twenty mosquitos would be placed in a jar over a small Stender dish* containing water on a Petri dish cover with a raisin or a piece of date for food. The jar would then be placed on a shelf in a dimly-lighted place, protected from ants by kerosene cups. Adult mosquitos may be kept alive for several days in such jars if they are fed with dates or raisins and a few drops of water, but if fed daily they will not bite and suck blood with alacrity. Anophelines do much better if they have one or two preliminary blood-meals before being fed with dates, raisins or bananas. In several experiments it appeared that in the mid-gut of mosquitos gorged with stale banana and the associated bacteria and yeasts, the fermentative acid contents either destroyed the flagella of gametes, or in some other way prevented the development of zygotes in the mid-gut of susceptible mosquitos. In one experiment a patient whose blood contained almost as many crescents as leucocytes was bitten by four varieties of mosquitos; three of the four being susceptible species, yet none became infected. This failure might be attributed to the feeding on bananas. . . .

Mosquitos were kept in these biting-jars until a suitable case of malaria presented. The blood of patients selected to be bitten contained gametes or sexual forms of the malarial parasite in their circulating blood in numbers sufficient to infect susceptible anophelines. The method of determining this point will be considered later.

BITING AND INFECTING EXPERIMENTS.

The earlier biting experiments were conducted at about 8 o'clock in the evening. After selecting a patient the jar of mosquitos was placed on the patient's forearm and covered with a heavy towel to prevent the disconcerting effect of light. Females several days old, that had been fed exclusively on dates or raisins, would generally bite greedily, and would feed on successive or alternate nights if given an opportunity. Most females would bite twenty-four or more hours after emerging, but before that period they would generally make no attempt to do so. When a jar is placed over a patient's forearm the mosquitos that are going to bite will almost always do so within a few seconds. If they show no inclination to visit the arm, a few gentle puffs into the opposite end of the jar, through the crinolin gauze, will make them change their position and frequently take up one on the patient's forearm. . . .

*A "Stender-dish" is one with a grooved lid fitting the rim of the dish.—EDS.

Later, it was more convenient to conduct the biting about 4 o'clock in the afternoon, and on these occasions it was generally necessary to cover the jars well with a thick towel.

Two classes of patients were used: Spanish laborers and West Indian negroes; the former rarely objected to being bitten the latter occasionally fretted a little. Both classes of patients were rather obtuse mentally and occasionally would not feel the bite, or would not be able to tell correctly the number of them. One reason for this is to be found in the limits of the number of separate points of pain appreciable within a radius of three inches—the biting area of the jar.

The Spanish patients' hands occasionally reeked with the odor of cigarette smoke, and a few of the West Indians had used citronella to prevent sand-flies from biting, but in neither instance did this interfere with the feeding of mosquitos. The hungry females, if undisturbed, will gorge themselves with blood and not infrequently will expel a drop or two of bloody fluid per anum. This not only occurs at the first feeding, but has been observed at subsequent feedings.

After as many of the females as will bite have done so, the jars are taken to the laboratory, one of the gauze covers carefully removed and at the same time replaced by a card which is slipped out when the jar is placed on a Petri dish. The Petri dish contains a small Stender dish with a few drops of water and a split rasin or two. The jar is then placed on an ant-proof shelf in a dimly-lighted place, and under these conditions, with fresh food and water, Anophelines may be kept alive for two or three weeks. If one has fed mosquitos late in the evening and does not care to transfer or uncover them by artificial light, the gauze may be moistened with a few drops of tap water and the jars placed on the shelf until morning.

At the time of biting the patient, two or three good blood films for staining were taken and differential counts of leucocytes as well as the proportion of gametes to leucocytes made the following morning. By this means, and by an occasional leucocyte count, it was possible to estimate from films the number of gametes ingested by the mosquito in feeding.

Then follow instructions how to estimate the number of gametes ingested by the mosquito, which involve a leucocyte count in the blood of convalescents, weighing mosquitos before and after feeding, and estimating their blood contents. A table of such weights follows:

WEIGHTS OF MOSQUITOS.

	Weight.
A. albimanus bred in laboratory twenty-four hours old, mid-gut empty	0.0008
A. albimanus bred in laboratory, moderate blood feeding	0.0016
A. albimanus caught in labor-cars, some blood in mid-gut, half developed ova	0.0019
A. albimanus caught in labor-cars, much blood and early development of ova.....	0.0035
A. albimanus caught at barracks, blood in mid-gut, no development of ova.....	0.0018
A. albimanus caught at barracks, blood in mid-gut, no development of ova.....	0.0021

The average weight of mosquitos twenty-four hours old was 0.0008 gramme, while the average weight of mosquitos from the same brood that had bitten and taken a moderate amount of blood was 0.0016 gramme. The average weight of blood ingested being then 0.0008 gramme, approximately 0.001 gramme. Assuming the specific gravity of blood in malarial fever with slight anaemia to be 1.050, then 105 : 100 :: 0.0008 : 0.000761 = the volume of 0.0008 gramme of blood. Now if there were *22* gametes per 100 leucocytes, as in Experiment 38, and 6,500 leucocytes per mm. as they were, by actual count, there would be $22 \times 65 \times 0.761 = 1088$ gametes ingested. If, under the most favorable circumstances, there are an equal number of male and female gametes, there should have been about 1,632 zygotes in this mosquito's mid-gut after three feedings, but as a matter of fact, there were only about fifty, showing a loss of about 97 per cent. This loss may be partly explained by an observation on the fate of gametes *in vitro* and *in vivo*, when it was noticed that

fully 50 per cent of gametes were phagocyted by polymorphonuclear leucocytes.

The article from which the foregoing extracts are taken contains much more valuable information not elsewhere available, and by permission of the author all is placed at the service of the SOUTHERN MEDICAL JOURNAL and its readers. Much of the remainder will appear in subsequent issues of the JOURNAL.

THE GAMETE CARRIERS: THEIR ROLE IN THE AETIOLOGY OF MALARIA

By GRAHAM E. HENSON, M.D.,
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In the discussion of means for the extermination of malaria, the significance of the gamete carrier has not been given the consideration that this factor deserves, this being due to the fact that until recently it was maintained that quinine had little or no action on gametes in the circulation, so that with the presence of gamete carriers we were apparently helpless in preventing the infection of mosquitos susceptible to the parasite except by the screening and quarantining of such carriers. Such measures would be impossible to carry out, for it has been demonstrated time and again that gametes exist in the circulation of man in sufficient numbers to infect the mosquito, and that such individuals may harbor this form of the parasite for long periods of time, without showing any clinical evidence of the disease. It was therefore a valuable work that Darling[1] conducted in Panama last year, demonstrating that this form of the organism is not only destroyed by the action of the quinine salts, but that the work is done quickly in the majority of instances, and done well.

To appreciate the true significance of this added ally in a campaign against this disease a clear understanding of the evolution of the parasite in both its asexual form in man and sexual form in the mosquito is essential.

With the bite of an infected anopheles sporozoites are injected into the human circulation, these forms being the final stage of evolution in the mosquito and which find lodgement in the salivary glands of the insect. It is a matter for discussion as to whether the sporozoites are of two distinct forms, one going on to the formation of schizonts, whilst others form gametes, or as to whether the sporozoites as injected are of but a single type and that the action of the human host causes certain of the later formed schizonts by a process of evolution to assume the form of gametes, whilst others remain in their original form. Schaudin[2] advanced this theory, and in support of it called attention to the fact that the gamete is never seen until the infection has been present for some time. Craig concurs in this view.

Following infection by an anopheles, after certain periods of incubation during which the corpuscle is penetrated by the sporozoite, there first appear in the corpuscle hyaline forms of a non-motile character which go through a process of evolution and are accompanied by certain clinical manifestations. According to the type of the infection these symptoms vary, and depending on the variety or presence of mixed infections present varied pictures of the disease, sometimes of a confusing character to those unfamiliar with all the phases a mixed malarial infection may give rise to. According to the type, after various periods of time, gametes are formed in the blood, gradually increasing in size at the expense of the red corpuscles which they occupy, and it is known that these forms can go no further in the process of evolution, of which they are capable when ingested by the mosquito, while remaining in man as macrogametes and microgametocytes for long periods of time, although the evolution of the microgametocyte to the form

of a full-grown microgamete may be observed in making wet mountings of blood under proper conditions.

With the transfer of the gametes from the human host to the mosquito the male goes on to the formation of flagella which become detached from the parent body, penetrate, and fertilize the female. Evolution by sporogony is established, which results in the formation of zygotes, which in turn become ookinettes, oocysts, sporoblasts ending in the sporozoite which become lodged in the salivary gland of the insect awaiting opportunity to enter the human host and resume evolution by schizogony.

It was advanced by Schaudin[4] that the macrogamete, if allowed to remain in the blood of the human host sufficient time, will undergo parthenogenesis, followed by the formation of young spores, which penetrate the red corpuscles and continue evolution by schizogony. He advanced this theory as the probable factor in recurring infections, but his observations lack confirmation. To Craig[5] belongs the credit for the most satisfactory solution of malarial recurrences, which it now seems beyond doubt takes place as a result of a process he has termed intracorpuscular conjugation. Ewing[6] described the process previous to the description given by this authority, but did not consider it of much significance and thought it of unusual occurrence. Darling[7] has since confirmed the findings of Craig. I have myself observed the phenomena, if such it may be called, in both the tertian and aestivo-autumnal infections. The process briefly described is one of protoplasmic union of two young hyaline forms occupying the same corpuscle, followed by the two chromatin masses becoming situated in one of the protoplasmic forms at various portions of the periphery of the organism, this being followed by a union of the chromatin bodies. The organism then takes on rapid growth, develops much pigment which finally becomes free in the blood plasma. It should be noted that this process does not take place early in the disease, but seems to be an increased effort on the part of the parasite to reproduce its kind by the formation of a resistant body, following a period of some length during which perpetuation has been carried on by schizogony.

With this knowledge of the forms of evolution the parasite assumes in man and the mosquito, together with the fact that we now have evidence that the gamete is destroyed by quinine, our actions toward the gamete as an aetiological factor and the extermination of the disease in so far as it is concerned by the presence of gametes, may be considerd under the following heads:

1. The interference with the evolution of the parasite in man by medication, with the view of preventing the formation of gametes.
2. The destruction of existing gametes in human blood in as short a time as possible.
3. The prevention of the gamete gaining access to the mosquito and thus allowing the perpetuation of the species.

THE INTERFERENCE OF THE EVOLUTION OF THE PARASITE IN MAN BY MEDICATION, WITH THE VIEW OF PREVENTING THE FORMATION OF GAMETES.

The question arises, can we by early treatment, in original cases, prevent the formation of gametes. I have observed that in cases which have received appropriate treatment early in the disease that gametes are scarce and very often entirely absent at any stage of the disease, while those cases that have received indifferent treatment on the first evidence of infection, develop in all instances gametes in large numbers. This would seem to indicate, that while the schizont is in the early forms, either that evolution of the gamete may be arrested to certain degrees by proper treatment, or, if we wish to take the view that there are injected specific sporozoites that go on to gamete formation, that this form of the sporozoite is destroyed to a large extent if the infection is properly treated early in the disease; but that, on the other hand, if the infection is allowed to go on uninterrupted that gametes will form in spite

of efficient treatment started late in the disease. On this supposition it seems probable that the formation of gametes can be checked, at least in so far as numbers are concerned, by the early and liberal use of the specific, and in this manner much accomplished toward the prevention and final eradication of the disease. Another important point is that early and efficient treatment which we know has destructive action on the young hyaline forms, by such destruction, interferes with possible intracorpuscular conjugation, which may take place if these young forms are allowed to remain in the circulation unmolested, this being followed by all the possibilities of the original attack being followed by latent malaria and repeated recurrences.

Another important consideration that I wish to touch on before leaving this matter of gamete formation is the very evident fact that the intensity of malarial infections is governed solely by the presence of heavy gamete carriers. Christophers[8] reported at the Malarial Conference held in India last year, the results of experiments conducted by him on mosquitos fed with the blood of sparrows containing in various numbers the gametes of proteosoma. He found that if he fed mosquitos (culex) with the blood of sparrows containing but a few gametes that the mid-gut of such mosquitos on dissection showed but a few zygotes, and that when the zygotes were allowed to mature and reach the salivary glands of the insect that there were but few of the salivary cells infected and that those that were did not contain sporozoites in large numbers. On the other hand, mosquitos fed with blood from the sparrow containing numerous gametes showed on dissection large numbers of zygotes in the mid-gut, and on maturing the sporozoites were found in immense numbers in all of the salivary cells. In the continuation of this line of research he found that by using a certain number of heavily infected mosquitos the resulting infections were sufficiently severe to produce death in every instance, and that in all cases the usual period of incubation, consisting of nine days in the moderate infections, was reduced to five days. In using equal numbers of mosquitos that were scantily infected or even by increasing the number, he was unable to produce a severe infection nor was he able to reduce the period of incubation. He concluded, "The amount of infection carried by mosquitos then depends on the number of zygotes which devlop in the mid-gut, and the number of these in turn depends upon the number of gametes in the blood of the sparrow by which the mosquito became infected. It is easy, therefore, to see that in malaria everything may depend upon the existence of heavy gamete carriers; and if these are present, upon the number of anopheles. Otherwise, the relation of number of anopheles to the amount of fever will not hold good."

THE DESTRUCTION OF EXISTING GAMETES IN THE HUMAN BLOOD IN AS SHORT A TIME AS POSSIBLE.

There is no doubt that up to the present time little effort has been made or thought given to the destruction of gametes existing in persons harboring this form of the parasite where they are carried for long periods of time without any clinical evidence of their presence. It is not within the province of this paper to take up in any detail the treatment of this infection, but I would say that the gamete forms will not be destroyed under anything short of what may appear to some as heroic medicinal treatment. Not only must the drug (quinine) be crowded to the fullest extent to produce pronounced cinchonism, but the treatment must be persisted in until the gametes are shown by microscopical examination of the blood to be absent. In Darling's observations previously quoted he found that in some cases a cure was obtained in a few days, but that in those that were heavily infected three weeks of treatment were necessary for their destruction.

While I believe that in most original infections there will be little opposition on the part of the patient to continued treatment if the matter is properly explained to him, it must be remembered that if this is not done there will

be no apparent necessity for any such line of procedure in so far as clinical symptoms or the personal inconvenience of the patient is concerned. It is therefore important in original infections to explain what the formation of gametes mean, not only in so far as recurrences to the infected individual are concerned, but the necessity for their destruction for the purpose of preventing the infection of non-infected mosquitos who in turn could not only infect others in the same household but increase the possibilities of infection in the entire adjacent neighborhood.

THE PREVENTION OF GAMETES GAINING ACCESS TO THE MOSQUITO, AND THUS ALLOWING THE PERPETUATION OF THE SPECIES.

This phase of the eradication of malaria is probably the most important that we have to deal with. In many communities the eradication of the mosquito, if not impossible becomes impractical owing to the immense fund that would be necessary to accomplish the purpose, but in no community is it impossible for the individual to protect against the bites of the insect. The importance, therefore, of public education on the mosquito as the carrier of malaria is one that cannot be dwelt on too strongly or too often. If we could convince man that the bites of certain mosquitos are dangerous and that severe illness may follow them, such conviction would doubtless bring about a great deal of individual prophylactic work, which would do much to reduce the danger of infection, and in conjunction with proper work by the state, bring about a condition that with the proper treatment of old gamete carriers would make it impossible for the mosquito to collect gametes and allow the perpetuation of the parasite, when malaria would perforce disappear.

But until such a time as a campaign of enforced screening of all homes and public meeting places has been generally effective, and I fear such a time is still a far call into the future, it is imperative that in addition to the proper treatment of cases showing acute clinical manifestations, some means be devised to corral all chronic gamete carriers who either have frequent recurrences or possibly only after long periods of time and that they be kept under treatment long enough to destroy all parasites they may be harboring.

While it may be impractical to expect that we can during the present generation entirely eradicate this disease, there is no doubt that if in the coming and succeeding years all cases could be treated in such a manner that the formation of gametes were restricted to the fewest possible numbers, that if treatment was continued along appropriate lines until such time as all parasites that did reach gamete formation and all conjugating bodies were killed, and that if during this period the patient could be protected from the mosquito or rather the mosquito protected from the patient, that malaria would fast disappear, and until such time as the disease should become totally exterminated, the intensity of the infections and the mortality rate would both be very markedly reduced.

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DISCUSSION.

Dr. Semmes, Talladega, Ala.—"This is a very interesting paper. In my portion of Alabama, malaria is not so prevalent as it is in the southern portion. In Talladega there is a state school for the deaf, dumb and blind, and it has been my work for a number of years to look after these afflicted individuals. I have had a great deal to do with malaria. A few years ago I made it a routine business to examine the blood of every pupil that entered the school, and kept a record of same, and out of about 700 pupils I found that about 11 per cent had the malarial organisms in their blood. I don't mean that any of

them were sick, but that 11 per cent of all of the children that came to the school were infected with malaria, though they seemed to be well. A good many of these cases have quinine for seven to nine months. You may think you have eradicated malaria after giving quinine for a month or so, but you cannot always do so. We do not have any of the mosquitos of the anopheles variety in winter when the children are there. I try them with the quinine for a month or so, then wait two months, and examine the blood again, and find the parasites again, and so am satisfied they would appear again without any reinfection. The organisms would get somewhere in the spleen or marrow and remain there for months. I heard Dr. DaCosta say twenty-five years ago that he did not believe that anyone ever got rid of malaria. I had a case where a patient was attacked with malaria six years ago, and she had been given quinine for six years, examinations at times showing the organisms, and others not. I believe that they are there all of the time. Regarding the giving of quinine it has been my custom to give it in whisky or in tr. fe. gr. 2, aq. q. s. tid. It is better this way than in the capsules, and seems to be more efficient."

Dr. Beckett, of Virginia—"I live in the southern side of Virginia, and I was educated here at Vanderbilt twenty-six years ago. I was under the instruction of Dr. Madden, and he was one of the best fever doctors in the country. I went to the south side of Virginia to locate, in a section that had some malaria, but not so bad as in this section. We have malaria in every part of the state of Virginia. The mountains are nearly free from it, but the coast and south side have a great deal of malaria. Of course I have been a victim of malaria, never having been sick in my life except from malaria. Now, in the treatment, if you will look to your liver and keep it right, and keep your heart right, you will be, as Dr. Talmage says, all right! Your liver for this world and your heart for the next. The more I think of it, the more I think Talmage was a physiologist as well as a psychologist. The thing to do in a malarial section is to keep your liver right. About one-third of the blood of the human body is in the liver, and when you fail to keep that right, you are going all wrong. When you give medicine in the beginning of malaria and don't get into the liver and bring out that blackish green stuff you are getting at the wrong end of the disease. You must bring it out. I don't believe that quinine will cure all cases of malaria. Of course quinine has its place, and when you are called to a case of malaria, and the patient is in an anemic condition, you must give something besides quinine. Give reduced iron, strychnine, and arsenious acid to build up the case of malaria. Build up your patient and he will get all right. That is the way. I don't believe in the mosquito doing all this devilment. I believe the malady exists where there are no mosquitos. I believe the winds bring the malaria out of our great swamps to our hills. I have had many cases in the hills, and have asked about mosquitos, and they say they have none. Still we must have chills and malaria right along. I believe in using the strychnine, iron and arsenic. If you don't take my advice you can let them go and die."

Dr. Krauss, Memphis.—"I think this paper of Dr. Henson's is a most excellent one. It is one of the best papers I have ever listened to. The subject of gamete carriers is open for discussion from three standpoints—the biological, the clinical, and the hygienic sides.

"About twenty years ago attention was first called to the aestivo-autumnal fever parasite, but the definite plasmodium was not thoroughly described. Now we know that the two types of plasmodium are described under one head. Malaria cannot be transmitted from person to person in the short cycle stage, unless by intravenous injections of the blood of the person with the malaria. I think it was Baccelli who claims to have transmitted malaria from person to person by using a needle upon a second individual, having taken the needle from a patient with malaria, transmitting it upon the unsterilized needle, simply soiled with blood. The mosquito cannot transmit the blood from person to person. It is necessary for the mosquito to complete the long cycle, which was begun in the human blood, and which takes a certain number of days.

"Regarding the pathology, I have observed a few cases that left little doubt in my mind as to the existence of the female infection, which is the only way we can account for these forms of malarial fever that show up in a week or more. We could not explain it upon any other ground very satisfactorily. It has been my custom in these cases to heavily cinchonize for the first week as much as the patient could stand, and intermittent cinchonization for a period of a week or two, or extend it over a period of a month or two, if necessary. I do not stop on the disappearance of the gamete, but take it for granted that there are some in the visceral circulation. The prophylaxis of malaria brings up some very interesting points. We all know of screening the houses and the patient, but the malarial patient that carries the gametes is not the one that is in bed, but it is the one who is not in bed, and who infects the mosquito on the outside, and I think this is so in the majority of cases. Any cases that are not freed of the gametes will go about as gamete carriers. We note cases especially where the soil is being turned up, as in the building of levees, etc. The turning up of the soil seems to result in an outbreak of malaria, but it is not. The reason is this: The men group together in tents, and some being gamete carriers, by colonization we get multiple infection. In screening houses, it must be remembered that we are not only screening the mosquitos out, but we must not screen any in. We should also examine the blood of every patient who has suffered with malarial fever.

The charge is laid at the door of the Southern practitioner that he treats all cases of fever as malaria. This is true in some instances. I know of one case where there were one hundred patients who were given quinine where one needed it. This is not so everywhere, but that is an isolated instance. Now the other side. How many cases of malaria are we treating for some other disease? I have seen patients who had no malarial symptoms. I know of one case who had gastric catarrh, and other symptoms, and examination showed the infection, the proper treatment resulting in his getting well. It stimulates anemia and cachexia, also nephritis. The diagnosis is easily made by the blood, but the specimens should be stained with fresh stain. I would not give a pinch of snuff for unstained blood smears"

Dr. C. C. Bass, New Orleans—"I think Dr. Krauss said a very important thing when he called attention to the irregularities arising from examining blood of unstained smears. I would like to also say something about mistaking blood platelets in front of and behind blood corpuscles for malarial plasmodia. With those well versed, such mistakes do not occur, but it has been my observation that it is one of the most difficult things for the student not to call blood platelets plasmodia. In addition to the platelets, dust particles are also present, which may give an erroneous opinion in examining for plasmodia, except by those who practice a great deal. With regard to sterilization of blood once infected, this practical idea suggests itself, and I think it can best be conveyed by recalling what happens upon the intra-venous injections of quinine. When quinine is taken by the mouth, the symptoms of the disease, or the gametes, do not disappear rapidly, but slowly. Intravenous injections of gr. V, shows within a few hours a disappearance of all the plasmodia except the gametes. We have had occasion to have students to follow patients for intervals. Take a patient with his blood loaded with the plasmodia, give an intravenous injection, take the blood from hour to hour, and in a few hours all of the plasmodia except the gametes have disappeared. In my opinion, quinine does not kill the gametes, but it keeps others from forming, and the old ones die of old age. How long it takes them to die I have no fixed idea. It is my impression from observations that the patients who take sufficient quinine for at least thirty days never have plasmodia until they are re-infected, and especially so of the malaria of the tertian type. In the aestivo autumnal type it occasionally happens that it will recur after quinine in sufficient quantities has been given for at least thirty days. I believe that the tertian and the quartan, probably, can be disinfected after the proper administration of quinine for thirty days, and that most cases of aestivo-autumnal must take quinine for sixty days. The question is how to give the quinine? We cannot agree upon this. I believe Dr. Krauss thinks that the intermittent administration of quinine, rather than the constant, is the better. On theory, and on my limited practical observations, I disagree with that idea. I think the merozoits and the segmented forms are destroyed by quinine. The gametes we cannot kill with quinine. If my idea that the merozoits are easily killed by the quinine be correct, it seems we would have more gametes in the blood with the intermittent administration of quinine than by the constant use of it. It is my impression that from 5 to 7 grains of quinine per day is sufficient to prevent the development of the longer form of the plasmodium, the blood finally becoming sterile by the dying out of the gametes."

Dr. White, New Orleans—"Someone mentioned the fact that there necessarily must be a massive infection to bring about the gametes in the blood. The quality as well as the quantity feature must enter here. This leads me to the first principles of prophylaxis. Going back to the first principles, let us consider a little history. New Orleans was known to have 50 deaths from malaria with one-half of its present population, whereas it now has about 25 or 30. The result was from drainage, and from drainage only. Some few other facts have also entered into the prophylactic measures. In the final analysis this is the solution of the whole problem. It is the only proper solution. We can do all we please by other means, and we have only applied palliative measures. The radical measure is the eradication of the mosquito. We have had some of the mistakes Dr. Krauss alludes to. I have taken charge of a hospital and found that patients who were there with chronic diseases had developed cases of malarial fever in the hospital. Screening in such cases is the remedy. If you are going to screen a hospital, school or a house, screen it so that no mosquitos can get in, and so that none can get out. Every door should be double screened. I hope to see the day when every hospital in the South will be screened so that not a single mosquito can enter, and that no stagnant water will be allowed to remain, and that we will have no anopheles, and no malaria."

Dr. Jackson, Florida—"I want to say we do not have any malaria on the east coast. We had a small quantity this year, however. We have some people from Missouri and from the river bottoms. We have our mosquitos in epidemics, and have to screen the houses so as to be able to sleep, and therefore we are mostly free from malaria. We now and then find a case. I do not want to leave the impression that we never have it. I do want to emphasize what Dr. White said regarding screening. I double screen every door. If we would do this in malarial communities, we would have about half the malaria to contend with, and I believe that is what prevents us having it on the east coast of Florida, where the water is running and the houses screened. In draining vast acres of Florida, small portions were left, and in these localities the men working there contracted the disease. Regarding examining the blood, I am sure we should have a good, fresh stain, for in some cases we have given the quinine which proved therapeutically the disease, where the microscope did not show it, due to poor stains. I believe if our state was drained properly and all of the houses screened we would have an influx of people and capital."

Dr. Henson, closing—"There are only a few points brought out in this discussion I wish to answer. I protest against the statement that once infected with malaria you carry it to the grave. There is another statement regarding the destruction of gametes. You may have them after six days, months or years, but if you do not give the proper dose of quinine you will not kill them. We cannot rely too strongly upon the observations of one man, but Darling's work in Panama, and his report of July a year ago, was so complete and the material at his command so abundant that I think we should take notice of it. While we have no time to take up the discussion of his experiments, they were briefly this: Any number of gamete carriers were examined, and they showed a certain number of gametes to the 100 leucocytes. These patients took quinine, grs. XXX, per day. When it was absorbed there was a reduction of the gametes. You may destroy the gametes in the peripheral blood by intravenous injections, but you cannot destroy them by gr. xxx per day internally unless you are sure it is being absorbed."

MALARIAL MANIFESTATIONS IN THE EYE.

By M. H. BELL, M.D.,
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My observations are based on the symptoms found in thirteen cases of eye trouble due to malarial infection, and while this is a small number of cases on which to base a paper, it will at least serve to emphasize the comparative rarity of eye disease from this cause since they represent all cases found in thirty-five hundred consecutive case histories in which the connection was so evident that I was sure of the cause in all with possibly one exception, which will be noted later.

Corneal ulceration, the usual lesion found, was present in eleven cases and two entirely distinct types of ulceration were noted.

In seven cases the common dendritic ulceration was present and in the other four were ulcers of the simple round variety, which in my case records have been designated acute herpetic.

In the dendritic type of ulceration I have also distiguished between an acute and a chronic form, not from any difference in the appearance of the ulceration, but from the history of previous malarial infection and the manner in which the local trouble responded to treatment.

The acute type of dendritic ulcer I have found only in an acute malarial infection and it has always responded readily to appropriate anti-malarial treatment in combination with the application of tincture of iodine to the ulcerated area and the usual local treatment employed for any corneal inflammation.

I have found this form of ulceration recurring at times, especially in cases where the treatment of the malarial infection had been stopped in too short a time and for the prevention of recurrence I have always placed most reliance in small doses of arsenic continued for some weeks.

In the chronic type a history of long-continued malarial infection is generally found, but the eye symptoms have always been preceded by one or more acute exacerbations, usually in the common form of "chills and fever."

In calling these cases chronic I mean all the term implies as will be seen from some of the cases reported and they have proved to be such trying cases that I have frequently wished the other fellow had the case before it was ended.

So far as local symptoms are concerned, the dendritic ulcers of both types are similar and are so well known that they need no new description.

The other form of corneal ulceration which I have designated acute herpetic bears no resemblance to the dendritic ulcer, and while I do not know that I am justified in classifying them as herpetic, since I have never found one in the primary stage, still I have examined cases very shortly after the beginning which were unquestionably either ruptured vesicles or lesions which had as their beginning a simple abrasion of the corneal epithelium.

Cases seen at this stage and energetically treated did not become infected and healed very rapidly without scar formation or corneal opacity.

In cases where infection was present the ulcer was of the simple round type involving any part of the cornea and I have always found them to yield readily to simple local treatment in combination with quinine.

I have found this form of ulceration in acute malarial infection only and besides the symptoms of corneal ulceration there is one symptom which I have always found present meriting special attention, namely severe attacks of neuralgic pain not only in the eye, but frequently along the supra-orbital branch of the fifth nerve and while the usual amount of pain will be present constantly this neuralgic form will come on at regular intervals corresponding to the type of infection present.

As a rule the neuralgia persists in returning for several days after the local symptoms have disappeared, but it has always yielded to quinine.

The ulcerations of this class have healed rapidly under the usual local treatment for simple ulcerations of the cornea in addition to treatment of the malarial infection.

1. The patient has been employed on the river and in swamps for three years and in that time has had numerous malarial attacks of the intermittent type. When first examined the left eye had been sore three weeks and the right eye one week. The symptoms were those common to all corneal inflammations and the most marked photophobia and blepharospasm I have ever found. There was typical dendritic keratitis small area upper part of each cornea. For ten weeks I saw the case regularly and used every medicine ever recommended without any result whatever and during this time the branching ulceration covered the upper half of each eye. The patient went north and was away four months. When he returned he reported that his eyes had been sore continuously, but were improving. I found the upper two-thirds of each cornea clear of ulceration and with no great amount of scarring. The lower third was still very cloudy, but no active ulceration was present. The corneae were so much scarred that he had to give up his occupation and I have not seen him since.

2. The patient has had several attacks of intermittent malarial fever during the past six months and following the last the eye has been sore for the past five days. Typical dendritic keratitis near the margin of the cornea. In this case pain was a very prominent symptom and for two months the ulceration continued spreading in spite of everything done for its relief. During this time the ulcer had branched out over the inner upper half of the cornea. After two months the process began to improve slowly and in the next month healed with a moderate amount of clouding of the cornea, which from its location did not interfere with vision seriously. This patient has had no trouble for the past three years.

With two other cases, making four in all, these represent the chronic type of dendritic ulceration.

3. Following intermittent malaria, three weeks ago the right eye became sore with the usual symptoms of mild corneal inflammation. On examination I found a dendritic ulcer near the centre of the cornea and prescribed heat, atropin and argyrol. One week later there were no new lines of ulceration, but the old ones were spreading laterally. I applied tincture of iodine and continued the other treatment. Three days later the tincture of iodine was used again and at the next visit the ulceration was healed. Two months later there was a recurrence, at which time I did not see the patient, but one month after that I saw her with the third attack and both recurrences involved the same lines as the original ulceration. This attack healed readily under the same treatment adopted in the first, and I gave small doses of arsenic for the following six weeks. So far as I know the eye has remained well for the past three years. With two others, the above is typical of the acute variety of dendritic ulceration.

4. During an attack of intermittent malaria the right eye became sore and at the examination a few hours later I found a small central abrasion of the cornea with the usual symptoms. The patient also had several small blisters on his lips at the same time. Under boric acid wash and atropin the abrasion healed with no resulting scar.

5. Following an acute attack of malaria the right eye became inflamed and when I saw the case a few days later I found a small shallow central corneal ulcer which healed very readily under the usual general and local treatment. For two weeks after the ulceration was well the patient had severe pains in the eye and over the forehead accompanied by slight ciliary congestion coming on at forty-eight-hour intervals. This was entirely relieved by

quinine and there has been no return of the symptoms.

Two similar cases have been observed, making in all four of this class, the acute herpetic type of ulceration.

6. Following a severe remittent fever this patient was very much annoyed by blurring of vision which at times was a frank double vision, but usually he could overcome that symptom. Examination showed practically normal distant vision in each eye and five degrees right hyperphoria. Nothing was done except to push anti-malarial medication and within one month all symptoms were relieved.

Whether this was due to the malarial infection or not I do not say, but simply give the history, treatment and results.

7. The last case I have to report is a personal experience and absolutely unique so far as I have been able to determine. In July, 1909, while at my desk reading from a very highly glazed paper I noticed what at first seemed to be a reflection from the paper and on moving it around to escape the annoyance found not a reflection, but a very dim obscuration in the right field of my right eye. In a very few minutes this partial scotoma had so increased that I had to quit reading. There was no definite outline and the scotoma occupied roughly the upper outer quadrant of the field. In appearance it gave exactly the sensation one has in looking over a stretch of sand on a very hot summer day. I could see nothing tangible still the circular outline was there waving, coming and going all the time. This lasted about fifteen minutes and was followed by a very decided shadow in the same part of the field, but no absolute scotoma was seen. After thirty minutes the eye was all right and the left eye had never been blurred. I did not know what to think, but as I had been reading very steadily for some time attributed the symptoms to a little over-use of the eyes, and forty-eight hours later the trouble came again with much more marked scotoma. Following this I had about one degree of fever with slight headache and yawning.

Blood examination showed a marked malarial infection and under quinine no further trouble was experienced.

At no time was either eye inflamed. No pain was present, nor other symptom and there was no other symptom of malarial infection.

Keeping in mind that this might have been a coincidence I did not think it worth reporting unless further proof was obtained and on July 1, 1910, without warning or previous symptoms of malaria the same symptoms in exactly the same order were observed in the upper outer quadrant of the field of the right eye. Blood examination: acute malarial infection. Quinine was taken for a few days only and on July 15 the symptoms returned, and on the 19th the same symptoms came in the outer field of the left eye. The recurrences were due to lack of quinine since I take as little as possible of that drug, but after the symptoms crossed over I pushed the quinine and have had no further trouble.

506-7 *First National Bank Building.*

DISCUSSION.

Dr. G. E. Vaughan, Clarksville, Tenn.—"I wish to compliment the Doctor on the excellent work he has done, not having heard a paper on the subject before. Here in the South it will probably clear up some cases that have been obstinate in our hands. I think it is very likely that we meet this condition more often than we recognize it. I have recently had a case of this kind that I can trace to no other cause, unless it comes by malaria. The young man told me himself that he knew nothing about it, except it came from malaria. No blood examination was made. So far as ophthalmoscopic examination of the eye, you could tell no difference. Subsequently, there was an improvement, and he has since not been bothered with the same trouble, and has the same vision that he had before."

Dr. G. C. Savage, Nashville, Tenn.—"The thing that interested me most was his reference to a case that showed five degrees of right hyperphoria. Did that disappear after your treatment? I want to say that neither malaria nor anything else other than much tone can produce a true hyperphoria. With that much hyperphoria, as he called it, if he had held a red glass in front of either eye, there would have been double vision. If it had been a paresis, and the patient had binocular single vision straight ahead, without any test at all, then on transferring the red glass to the other eye, there would have been only one light. I think the time has

come when we must separate phorias from paresis and paralysis, and it is just about as easy to do as anything that can be done."

Dr. G. E. Vaughan, Clarksville, Tenn.—"In using argyrol for ulceration my patients have experienced pain. After leaving argyrol off patients would improve."

Dr. C. C. Cullom, Nashville, Tenn.—"I was interested in Dr. Vaughan's statement, the pain caused by argyrol. I think it is due to some change that takes place in the argyrol. I have had patients for whom I have prescribed a ten per cent. solution of argyrol. They complained most bitterly of it, said the pain was unbearable. I then put them on a twenty-five per cent. solution that was properly prepared, and they did not complain any. Pure argyrol is less irritating than water. I have never seen any prepartion of silver that caused less pain than argyrol when it was fresh. I think some druggists, where argyrol is not prescribed often, have kept it on their shelves for some time. In all those cases where I have prescribed the solution fresh in my office, it has produced absolutely no pain."

Dr. Lyle.—"There is one phase of the paper that interested me quite considerably, the experience of amblyopia referred to that was cleared up by the use of quinine. I myself, possibly a year ago, in walking across the street had the same sort of experience that Dr. Bell refers to. I really became so apparently blind that I was unable to recognize anyone ten or twelve feet away. I attributed it to toxemia. A few days later I had the same sort of experience while reading at my desk, as the doctor expressed his sensation, and found that it was due mainly to the strain that I had from the transverse light. Afterwards I discovered that that would come on quite frequently. I was not exactly sure of it. I live in a somewhat malarial country myself, and am very glad to hear that he got results from the use of quinine. I had attributed it altogether to the transverse light that affected me that way."

Dr. E. C. Ellett, Memphis, Tenn.—"It seems to me that the point to which Dr. Lyle has referred is the essence of this paper. It might be that a good many conditions that we are not exactly certain about might turn out to be something of this sort. We may find that these are malarial. In regard to the corneal complications that the Doctor spoke of, I suppose we have all seen those around superficial ulcers. I have never regarded those as malarial. There are two remedies that I happen to know; one is the bi-sulphate of quinine applied locally, the other remedy was thrust upon me. I had a patient, who, I think, traveled in the interest of some lumber firm. We had used everything. It became necessary for him to make a trip to the lumber camp. He came back in two or three days and his eye was doing nicely. He struck a laborer down there who advised him to put an onion poultice on it, and it cured him over night, practically so. I do not know whether any of you want to take advantage of that prescription or not."

THE VALUE AND LIMITS OF LABORATORY DIAGNOSIS.*

By A. E. THAYER, M.D.,
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With reference to the value of laboratory work, both in recognizing the nature of various diseases and in following the progress of the cases, certain general statements may be made which hardly any one would dispute:

1. Medical and surgical practice has advanced marvelously in the last twenty-five years.

2. Much of this advance has been accomplished in the laboratory, for example, Murphy's button, many intestinal sutures, much of the Mayo brothers' work, and numerous methods which serve for greater accuracy in the internist's hands.

3. He is most often right in his diagnosis, he best understands the condition of his patients, who makes the fullest use of laboratory assistance, and if this is true in the great hospitals as a matter of routine, it ought to be as true as is feasible in work outside of hospitals.

4. The practitioner cannot carry on the laboratory work personally, for it implies special training, apparatus, methods, and more time than he can devote.

5. It follows then that as medicine advances a new kind of man develops, the laboratory worker as distinguished from the bedside man, whether internist or operator, for this is a specialty by itself, and like other specialties, except in its inadequate recognition and rewards.

6. It follows that between the bedside man, who sees the patient, and the laboratory man who does not, there are certain relations which, being relatively new, are not always clearly understood.

Assuming that the laboratory man wishes to be of the utmost service to the bedside man, and that the latter wishes to avail himself to the utmost of the resources of the laboratory work, what are the limits and conditions under which it is inevitably carried on, which must be understood before the best results can be attained?

In general terms both the laboratory man and the bedside man are united in this, that they wish to ascertain as much as possible of the condition of the patient. The bedside man is responsible to that patient, the labora-

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tory man only to the practitioner, though too entire a separation between the laboratory worker and actual cases is not desirable—he should see or should have seen many patients, for a wide clinical experience makes his results far more valuable than they otherwise could be. But it is the bedside man who calls on him for aid, not the patient, though people of good education are growing so wise that they appreciate the need more and more of having various examinations made.

Doctors are of two kinds, those who never bother with laboratory studies, but content themselves with a look at the tongue and the thermometer and a feel of the pulse, and those who are enthusiastic and expect too much, and those who recognize that the laboratory findings are only a part of the record, and that the man in the laboratory can neither make diagnosis nor should attempt it; he merely reports what he finds in a given specimen, and the man at the bedside assigns to such a report its due value in the total clinical picture, and no more. In other words, there are extremely few cases which can be rendered absolutely clear by some pathognomonic laboratory finding, thus saving the clinician the trouble of making a diagnosis. Most of the new methods go through similar stages, at the first too much being expected of them, then comes a period when they are discredited, then the per cent of error in them is determined and they fall into their rightful place. Examples of valuable aid in many cases to be derived from laboratory study need no mention, others may be briefly touched upon, as the diazo reaction which helps to confirm the diagnosis of typhoid or in the eruptive diseases of childhood may serve to distinguish between true measles and German measles; examination of the spinal fluid in suspected meningitis; the use of the laboratory by the surgeon to control his technic when one of those times comes when things go wrong, and a bacterial examination of his and his assistant's and nurses' hands, the ligatures and dressings, discovers where the source of infection is; or if the surgeon has a case of appendicitis and is uncertain whether to operate, hourly counting of the polynuclears will show whether the increasing number of these makes further postponement unwise. These and many other cases require no comment, but consider a few which are less obvious. There is the very common case of the chronic dyspeptic or neurasthenic, who has drifted from one physician to another, perhaps had a test meal and nothing abnormal has been found; though discouraged, he sees yet one more physician, who by complete examinations of blood, urine and feces discovers that the underlying cause is putrefaction of proteids in the small and large intestine; the man is doomed to chronic invalidism, and I have had such patients who contemplated suicide, until and unless such laboratory work is done, and then they can frequently be cleared up and cured soon and permanently. Such conditions are sadly frequent, too often overlooked, and they lie at the bottom of nervous prostration, chronic headaches, vertigo, anemia, neuralgias of various kinds, and other complaints, beside complicating well recognized maladies, and little can be done till they are controlled. Take the case of the ill nourished anemic child, whose blood on examination shows many eosinophile cells, which at once suggests an intestinal parasite and examination of the feces shows hookworm eggs, which is easily remedied and the case improves like magic. Eosinophiles in the blood also help to distinguish true asthma from cardiac and renal dyspneas; and erythema multiforme and pemphigus and dermatitis herpetiformis from other skin lesions. In cases of obstinate acne and boils, autogenous vaccines may be made in the laboratory which aid materially in the recovery of the case. With persistent deficiency in the excretion of the total solids of the urine, with too low urea excretion and too high acidity, a condition which is very common in chronic invalids and at times is followed by thyroid troubles, a series of urine examinations indicates the nature of the dis-

ease and the required treatment as nothing else can. Discovery of acetone and diacetic acid in the urine of the diabetic may herald approaching coma in time to ward it off. In cachexia with or without tumors, say in the abdomen where they are so hard to recognize early, complete examinations of the blood, urine and feces may disclose a far worse cachexia than was before appreciated and lead to the consideration of operation at a time when it may be of most service. For example I briefly sketch a case in which I was called in as consultant last May. A man beyond middle life, of large business affairs, began to suffer with severe diarrhea and loss of flesh and strength; no diagnosis was reached and no treatment gave any relief. When I was called in I made thorough examinations of feces, blood and urine, as well as a searching physical examination, and reached the conclusion that there was a carcinoma of the head of the pancreas, which had not been suspected before; asked how long the patient might live, I hazarded the opinion that three weeks would be the limit, and advised that he put his affairs in order at once, while still able to do so. This was done, and he died in a little over two weeks. I asked for a post mortem examination, which was refused, but his physician said that before the end of the case he was satisfied of the correctness of the diagnosis. These and many other instances of the value of laboratory findings might be mentioned, but I pass to consider the limits under which such work is necessarily done. The first and most important claim I wish to make for the laboratory man is that he does not make diagnoses; in the nature of the case he cannot, and it ought not to be expected of him. Where there is dissatisfaction with the results of laboratory work, much of it can be traced to just this necessary limitation which has not been understood. All he does, in the majority of cases, is to furnish information for the bedside man to add to all the other facts at his command, so that the more examinations of different kinds he makes in a given case, the higher the value of his aid, as a rule. Again take a few concrete instances to illustrate what I mean by saying that he cannot make diagnoses; very often the clinician has a shrewd suspicion of the nature of the case before he sends the material to the laboratory and the results there merely confirm this.

Much confusion occurs in the diagnosis of malaria and typhoid because of the well established tendency of some features of the disease, in each case, to persist. In one case which I tested, of a man in apparent health who had had typhoid nine years before, there was a good Widal reaction, and in another after eighteen years. Suppose that such a patient has a fever and blood is sent to the laboratory; the report comes back that a Widal reaction is there and no malarial organisms are found, yet the case may be malaria after all, and the blood being taken at a time when there were no plasmodia in the peripheral circulation shows nothing of the real disease but does show the persistent Widal. A few doses of quinine cure the case, apparently, and the clinician is sarcastic about the laboratory. The converse of this is also common; a man who has had malaria several times and still carries a few organisms in his blood, without any inconvenience to himself, a condition which I have found very common in the South especially among the negroes, and which the Khartoum laboratory has also reported from Africa—such a man begins a typhoid fever, and sometime in the first week his blood is examined, showing no Widal but a few malaria plasmodia; the laboratory report is accurate but the clinical course proves the case typhoid. In neither case does the laboratory make a diagnosis, it cannot; all it can do, all that the clinician wishes it to do, is to report exactly what was seen; the laboratory cannot be responsible for any more than that. Another case is where a man undoubtedly has malaria but he has taken some quinine on his own account, and when the doctor sees him and sends his blood there are no recog-

nizable plasmodia, and the laboratory reports, not "this patient has not malaria" but "no plasmodia are found in this sample;" that is all.

Suppose it is a sample of sputum for tubercle bacilli, even in so common an everyday examination the clinician must be on his guard to value the findings neither too high nor too low; bacilli may be present but not such as will stain, and a negative report does not eliminate tuberculosis, for the peculiar waxes in the bodies of the bacilli which cause them to be acid-fast may not have developed, and only animal inoculation will prove whether they are present or absent. In the contrary case, where a large amount of sputa on being condensed may show one or two bacilli, the clinician is the only one who can determine whether they are chance bacilli lodged in the mouth from street dust, or from milk or butter recently ingested, or whether he would not do well to make a careful laryngoscopic examination in addition to listening to the lung. Perhaps in this very common disease, pulmonary tuberculosis, valuable time is too often lost by waiting for a laboratory report of many bacilli present, and if the diagnosis were made from physical examinations alone it would be better for the patient.

Other limitations to satisfactory work come from the way in which specimens are sent to the laboratory. Small bits of delicate tissue wrapped in dry gauze cling so fast to the cloth that it is almost impossible to preserve relations in separating them; when there is suspected cancer of the cervixo and uterine scrapings from high up in the cavity of the uterus are sent the only report possible is "not malignant," and yet the clinician knows otherwise. In collecting a twenty-four-hour specimen of urine two serious faults are common, no preservative is put in the container, so that a steady decrease in the acidity and decomposition of the urea prevent accurate reports; and the patient, in starting at a special hour, passes into the container what urine he then has in his bladder, which has been secreted during no one knows how many hours previously, and this is wrongly considered part of the total twenty-four-hour specimen, making the totals of the ingredients all too high when the amounts in a liter are multiplied by the entire amount. Again, when a surgeon wishes the bacteria determined in some exudate, but puts his material in any chance container, he insures untrustworthy results of the laboratory study, for germs in the unsterilized container may overgrow and kill out the ones in the exudate.

Yet another curious thing is the slight antagonism between the clinical man and the laboratory man, which sometimes leads the former to suppress all the details of the case and say nothing of the place from which the material came, nor how it was taken; every laboratory man has encountered this, and it makes his work far less satisfactory to both himself and the clinician.

Another special case is that of having frozen sections of tissue made during the course of an operation. This was heralded as a great advance at one time, but many of the large clinics have discarded the method. A frozen section may often be sufficient to distinguish the nature of a growth, but often it is untrustworthy; for example, simple granulation tissue may closely resemble round celled sarcoma and require a carefully made paraffin section to differentiate it. The diagnosis of tumors is by no means an easy thing; I have seen some of the best men on tumors study over one for an hour before hazarding an opinion, and it is asking a good deal of the laboratory man, with the admittedly imperfect method of frozen sections, to be right every time in his hasty diagnosis. Wherever possible a careful paraffin section, which by the rapid method takes only from six to eight hours, should be asked for.

Summing it all up, we may safely assume that the laboratory man is really desirous of serving the clinician to the best of his ability, but he works within certain limitations which are inevitable the world over, for in the labor-

atory we are dealing with methods and results which are but probable, at times strongly so and at others only reasonably so, and laboratory findings ought always to be controlled by clinical findings. For instance, consider the Widal reaction; perhaps the majority of physicians look upon its presence as making the diagnosis of typhoid fever; but beside its known ten per cent of error, I venture to say that it never makes the diagnosis of typhoid; all that it does is to establish whether there are, or are not, typhoid agglutinins in the patient's blood. If not present, it may be because his system has not yet had time to make them, and it is known that they are seldom present before the fifth day and often not till the second or third week, or even not till convalescence. If present they do not prove that the patient has typhoid fever, he may have had it years ago, or, being a typhoid bacillus carrier, may never have had the disease while always harboring the bacilli and having agglutinins in his blood. So a positive report on a Widal test requires the clinician to ask, "has the patient agglutinins but no typhoid?" and a negative, to ask, "has the patient typhoid fever but no agglutinins yet?"

Beside limitations in the methods, which are inseparable from them, there are others which the clinician can do much to remove; and in many cases the dissatisfaction with the laboratory, when there is any, rests in not having examinations enough made, of all the possible kinds, and with sufficient frequency to remove all accidental error.

Recognizing the real conditions, with an attitude of trust and mutual helpfulness, the clinician and the laboratory worker together may do much for the spread of accurate scientific medicine.

A RESUME OF CASES OF MALARIA AND OF CASES SUSPECTED TO BE MALARIA, EXAMINED IN THE PAST THREE YEARS.

(CONCLUDED FROM JANUARY NUMBER.)

(FROM THE POLYCLINIC LABORATORIES.)

By JOHN M. SWAN, M.D.,
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CHILLS SIMULATING MALARIA CAUSED BY SEPTIC ABSORPTION.

This case is of considerable interest on account of the characteristics of the temperature curve and the slowness with which the symptoms developed. At the time of the patient's admission he had a continued fever with remissions of about three degrees. His spleen and liver were both enlarged, were both tender, and the blood count made at that time showed 9,000 leukocytes, 14.8 per cent of which were large mononuclears; 1,332 large mononuclears to the cubic millimeter of blood. No malarial parasites were seen, however. The physical examination showed a distinct pulmonary consolidation which was thought to be tuberculous. The absence of malarial parasites from the peripheral blood led to the opinion that malaria was not a part of the clinical picture. The patient had a discharging ear which developed a short time after his admission to the hospital and two weeks after his admission he had a tonic convulsion at ten o'clock in the morning which lasted about three minutes. During the remainder of the day he had seven other similar convulsions. The convulsions were not followed by paralysis. The knee jerks were not exaggerated; there was no ankle clonus and the Babinsky sign was absent. Still later a discharge from the opposite ear was discovered and a few days after that the discharge

had ceased from both ears. On the 8th of March the patient had been complaining of headache for several days and an examination appeared to show that the spleen had diminished in size, although it was still palpable and tender, and that the liver was still enlarged and tender. The superficial lymphnodes were also enlarged. At this time Dr. Camp, of Professor Spiller's clinic, made a diagnosis of cerebral abscess. The patient was operated on and a cerebral abscess containing about three drams of pus was evacuated. At about this time the patient had chills, his temperature was constantly above the normal line, ranging between 100 degrees and 102 degrees, pulse very rapid, and respirations increased in frequency; and a second examination failed to show malarial parasites. The chills were evidently due to septic absorption either from the track of the cerebral abscess or from an undiscovered and unevacuated abscess. A differential count was made only shortly after admission and not at the time of the second examination for malarial parasites.

We are not warranted in assuming that malaria had anything to do with the illness from which this patient was suffering at the time he was admitted to the hospital or subsequently. Although the man was a native of Italy, there was no definite history of malaria. At the same time the chronic enlargement of the liver and spleen, with some jaundice, might very readily be assigned to a previous malarial infection, and the increase in the large mononuclear leukocytes (14.8%) might be dependent upon that circumstance, but this does not mean that malaria was not in any way responsible for the pathological conditions found during the patient's last illness. It is possible that, had an autopsy been permitted, malarial pigment would have been discovered in the spleen or the liver.

CASE II. SPLENOMEGALY.

Female, white, aged about 40 years, occupation housewife. Was admitted to the hospital (13316) in the service of Dr. B. F. Baer with a diagnosis of chronic splenic tumor.

Family history: Negative.

Previous history: Negative.

Present trouble: Four years before the patient was first seen, she noticed a sudden enlargement of the abdomen with much pain and tenderness in the left side. The pain and tenderness were not constant. The conjunctivae were yellowish. There was some ascites but no edema of the legs. The liver was enlarged and palpable on deep pressure, its edge was hard and firm, but not tender. An examination of the blood made four days after admission gave the following results:

Erythrocytes	5,270,000
Leukocytes	12,400
Ratio	1—425
Hemoglobin, per cent	86
Color Index	0.81

Differential count:

Polymorphonuclear neutrophiles	74.4 per cent
Lymphocytes	12.0 per cent
Transitionals	11.4 per cent
Eosinophiles	2.0 per cent
Basophiles	0.2 per cent
	100.0 per cent

No malarial parasites were found. A second examination was made about five weeks later with the following result:

Erythrocytes	4,810,000
Leukocytes	4,000
Ratio	1—1202
Hemoglobin, per cent	78
Color Index	0.81

Differential count.

Polymorphonuclear neutrophiles	70.0 per cent
Lymphocytes	5.8 per cent
Transitionals	19.4 per cent
Eosinophiles	3.6 per cent
Basophiles	1.2 per cent
	100.0 per cent

No malarial parasites were found.

This case is one in which it has been impossible to arrive at a complete diagnosis. The patient was admitted for chronic splenic tumor. A large liver was associated with the enlarged spleen. The question at issue was whether the case was one of chronic malaria, myeloid leukemia, or splenic anemia. The original blood examination immediately excluded myeloid leukemia. The same blood examina-

tion would tend to discredit the view that the case was one of splenic anemia, on account of the leukocytosis, although the large percentage of transitionals (11.4) would seem to point to that condition. The second blood examination made five weeks after the first which showed a leukopenia (4000), a moderate degree of chloroanemia (color index 0.81) and a further increase in the percentage of transitional leukocytes (19.4) would seem to point to this condition. The question of the relation of a possible previous malarial infection to this case is interesting and one that can never be definitely determined. The patient could not recall ever having had acute malaria. She was a native of Italy, however, and it is well within the range of possibility that at some time during her life in that country she had had a malarial infection. If we are to consider that an increase of large mononuclear and transitional cells is positive indication of previous malarial infection, as some writers would have us do, we would necessarily conclude that this case was dependent upon a previous malarial infection, but it is now well known that other conditions may be accompanied by an increase in these cells. Personally, I am inclined to lay little stress upon such an increase as indicative of previous malarial disease and am inclined to look upon this case as one of beginning splenic anemia and not one of chronic malaria.

CASE 12. MYOCARDITIS.

Female, white, aged 37 years, occupation housewife and lecturer on missionary subjects; was a private patient (660) who presented herself with a diagnosis of chronic malaria.

Family history: Negative.

Previous history: The patient had had the usual diseases of childhood, including scarlet fever. She was married at the age of 22, and went to India with her husband, who was a missionary in Assam, in 1892. She remained in India until 1900, when she came home and remained for three years. She returned to India in the autumn of 1903, and remained on the field for a year and a half. In June, 1905, she returned to the United States. On her arrival in India, in 1892, she weighed 111½ pounds. Four months after her arrival in India she had an attack of malaria. This attack lasted, with intermissions, fairly continuously until she returned to the United States in 1900, except during the time that she was pregnant eleven years ago. She had one miscarriage at seven months, which was brought on by an attack of fever and lack of medical attention. She had had no diarrhea. She had complained of some difficulty in holding the urine in the morning.

Present trouble: The patient complained of irregular attacks of fever of varying length without definite periodicity. These attacks dated from her return to the United States in 1905 on account of poor health. Whenever the weather was warm and damp she had fever and when the weather cleared and the atmosphere was dry the attacks disappeared. She might have one attack in a month, one in two months, two in a month, etc. The attacks of fever came on slowly and for a week or less before the fever developed she was more sleepy than usual. She complained of lassitude and of general malaise with a chilly feeling. She had had no distinct chill during any of these attacks in the last two years. The thermometer had registered 101 degrees. The febrile attacks usually occurred between 11 a. m. and 3 p. m. She complained of cyanosis of the fingers and lips. There was no headache, no interference with vision, no sore throat, no nasal discharge, no cough, no expectoration, no chest pain. There was slight dyspnea on exertion; palpitation of the heart, but no vertigo; slight nausea, but no vomiting. No abdominal pain or tenderness. The bowels moved daily. The stools were semi-solid, brown, contained no blood and no mucus. The menstruation was regular, lasted five days, and was painful on the day before or on the first half day of the flow. There was no edema except a slight

puffiness of the hands and fingers with numbness. No suborbital edema. The patient slept poorly. Her appetite was only fair. There was a tremor in the head and hands, no goiter, no exophthalmos.

Physical examination: The pupils were normal and reacted to light and distance. The conjunctivae were slightly pale and the sclerotics bluish.

The tongue was slightly coated; the teeth were well cared for; the mucous membrane of the mouth was pale; the throat was a little red; the complexion was sallow; the pulse was 64 per minute, dropped about every third beat and showed a tendency to dicrotism; temperature 99.20. The chest was long and narrow; the intercostal angle was acute. Examination of the lungs showed no pathological signs.

Heart: The apex beat was neither visible nor palpable. The sounds were heard best in the normal position. There were no murmurs. The heart dropped every other beat. The muscular quality of the systolic sound was poor. The abdomen showed no pathological signs. The liver dullness extended from the sixth rib to the costal margin; the edge was palpable on deep inspiration. The splenic dullness was not obtainable on account of distension of the colon; its edge was not palpable. There was no ulceration in the nose. An examination of the blood gave the following result:

Erythrocytes	4,730,000
Leukocytes	8,000
Ratio	1—5914
Hemoglobin, per cent (Fleischl)	93
Color Index	0.98x

Differential count.

Polymorphonuclear neutrophiles	59.8 per cent
Lymphocytes	24.8 per cent
Large Mononuclears	10.4 per cent
Transitionals	3.2 per cent
Eosinophiles	1.8 per cent
	100.0 per cent

No malarial parasites nor pigmented leukocytes found.

Examination of the urine gave the following results. Color, pale amber; reaction, acid; specific gravity, 1016; considerable cloudy sediment composed of leukocytes, epithelium, mucus, and micro-organisms. There was a trace of albumen, but no glucose.

Examination of the feces gave the following result: Neither ova, embryos, adult parasites or protozoa present.

This is an interesting case. The patient had been treated for a considerable time by numerous physicians as one of chronic malaria. The only disease that could be demonstrated upon physical examination was a myocarditis. The examination of the blood showed a picture that was distinctly not that due to present or past malarial infection. The symptoms were relieved by treatment directed toward the improvement of the myocardium.

CASE 13. STRICTURE OF THE URETHRA.

White, male, aged 26 years, by occupation a student; was a private patient (658) who complained of chill, fever and sweat. The patient was first seen about nine o'clock p. m. when his temperature was 105 degrees, pulse 120. The family history was negative. He had had a similar attack of chill, fever and sweat the day before he was first seen. The patient had not been sick for several years, except for an attack of gonorrhea one year previously. The morning following the attack of chill, fever and sweat in which he was first seen, the patient's temperature was 98.4 degrees and pulse 76. He felt tired and weak and had not slept well. The patient was a native of Mexico, and an examination of the blood was made with the idea that the attack might be due to malaria. A cell count was not made but the differential count gave the following results:

Polymorphonuclear neutrophiles	72.5 per cent
Lymphocytes	18.0 per cent
Large Mononuclears	4.5 per cent
Transitionals	4.5 per cent
Eosinophiles	0.5 per cent
	100.0 per cent

No malarial parasites were seen.

An examination of a specimen of blood taken at night failed to show filaria embryos.

Two days after the first attack the patient was again seen with an attack of chill followed by fever and sweating. He had eaten pork for

dinner. The chill began at 10:30 p. m., and while he was having the chill he vomited. At 1.30 a. m. the patient's temperature was 106.4 degrees, pulse 124. A soft systolic murmur was heard at the base of the heart which was not transmitted. There was harsh breathing at the base of the lungs. There was no enlargement of the spleen. The patient was perfectly conscious. At 10 a. m. the following day the temperature was 98.4 degrees, pulse 82. The patient was perspiring slightly and showed no pathological signs. Seven days after this attack the patient had another attack of chill, fever and sweat which began at one o'clock in the morning. His temperature was not taken. An examination of the urine at this time showed a large amount of pus, mucus and bladder epithelium. The color of the specimen was amber; its reaction acid, and it had a specific gravity of 1.017. There was no albumin and no glucose. The patient was referred to Dr. Edwin Martin, who, with considerable difficulty, succeeded in passing a filiform bougie into the bladder. The prostate gland was uniformly enlarged but there was no area of softening. There was a stricture of the urethra 2 3-4 inches from the external urinary meatus which would not allow a No. 23 bougie a boule to pass. A No. 16 would pass this stricture, accompanied by much pain; but it would not enter the bladder. The bladder could only be entered, as above stated, with a filiform. Dr. Martin, under ether anesthetization, performed a combined external and internal urethrotomy. Following this operation the patient had no recurrence of his chill, fever and sweat.

This is plainly a case of a symptom complex resembling that of malaria which is dependent entirely upon septic absorption from a stricture at the bulbomembranous junction.

CASE 14. EMPYEMA OF THE GALL BLADDER.

White, male, aged 55 years, occupation farmer, birthplace Russia; was admitted to the hospital (15101) in the service of Dr. A. A. Eshner with a diagnosis of malaria. The patient was a resident of New Jersey.

Family history: Negative.

Previous history: Thirty years ago while he was living in Russia the patient had malaria; otherwise he had always been strong and healthy up to his present illness, except for an attack of smallpox during childhood.

Present illness: For five weeks the patient had been complaining of pain in the lower right quadrant of his abdomen. The onset was sudden and in the afternoon of the day in which the pain began he had a chill which lasted about half an hour and which was followed by fever and sweat. After the chill he was drowsy and slept some. About a week after the beginning of the condition the patient had pain in the epigastrium and the pain had been located in that region ever since. For the four weeks preceding his admission the patient had an attack of chill, followed by fever and sweat, every day and sometimes he had two in a day. He never had more than two in one day. The patient had a good appetite but when he ate he felt as though his food was stuck in his eipgastrium before it entered the stomach. The epigastrium pain was constant.

Physical examination: Examination of the lungs showed no pathological signs except a slightly hyperresonant note at the right apex. Heart showed a rather weak and indistinct first sound with no murmurs. The second aortic sound was not accentuated. Abdomen was distended and tympanitic, and marked tenderness was obtained over the region of the gall bladder. There was no tenderness over McBerney's point. Liver dullness was increased downward and to the left. The lower margin of the organ was distinctly palpable two fingers breadth below the costal margin. The upper border of liver dullness extended to the fifth interspace. There was tenderness on pressure in the epigastric triangle and along the right costal margin as far as the anterior extremity of the seventh rib. The spleen was not enlarged. The patient was jaundiced.

His mucous membranes were pale, his skin dry. His pupils were equal, reacted normally to light and accommodation. His breath was foul and his tongue was heavily coated with a brownish fur.

Examination of the blood gave the following results:

Erythrocytes	4,130,000
Leukocytes	42,320
Ratio	1—97
Hemoglobin (Fleischl), per cent	57
Color Index	0.69

Differential count.

Polymorphonuclear neutrophiles	92.2 per cent
Lymphocytes	1.4 per cent
Large Mononuclears	3.8 per cent
Transitionals	1.0 per cent
Myelocytes	1.6 per cent
	100.0 per cent

No malarial parasites found.

Examination of the urine gave the following results: Color, straw; reaction, acid; specific gravity, 1,030; a small amount of white flocculent sediment composed of leukocytes, amorphous urates and uric acid. No albumin, no casts.

Examination of gastric contents: The gastric contents were withdrawn after the administration of an Ewald test meal. Amount obtained, 60 c.c.; reaction, acid; odor, musty; fluid, milky white containing a small quantity of mucus, epithelial cells, leukocytes, starch granules, fat globules and fungi. Total acidity, 75. free hydrochloric acid present but the amount not determined; no lactic acid. The patient was advised to have an operation for the relief of his gall bladder condition, but the operation was refused and the patient was discharged at his own request.

This case is interesting because the patient was a man who had lived in a malarial district and who had malaria previously. In addition to that he was living in a district in which malaria is supposed to be prevalent. The physician who referred the patient to the hospital said that he had malaria, basing his diagnosis upon the frequent recurrence of chill, fever and sweat. The blood examination was made as soon as the patient was put to bed and a physical examination was made. The fact that there was a leukocytosis of 42,000 was a polymorphonuclear percentage of 92.2 disposed at once of the diagnosis of malaria. The absence of malarial parasites was, of course, to be expected in such a condition. Although no operation was done so that the diagnosis of empyema of the gall bladder could be confirmed, there is hardly any question but that that condition was present. The same history and results would be obtained in a case of amebic abscess of the liver which is usually treated with quinine under the impression that it is a case of malarial infection before its real nature is discovered.

CASE 15. DEFINITE DIAGNOSIS NOT MADE.

Male, white, native of Italy, aged two years, nine months; was admitted to the hospital (17740) in the service of Dr. Samuel McC. Hamill with a diagnosis of paralysis of the throat and hysteria. The mother said that the child would not eat because it was unable to swallow. These symptoms were of ten or twelve days duration.

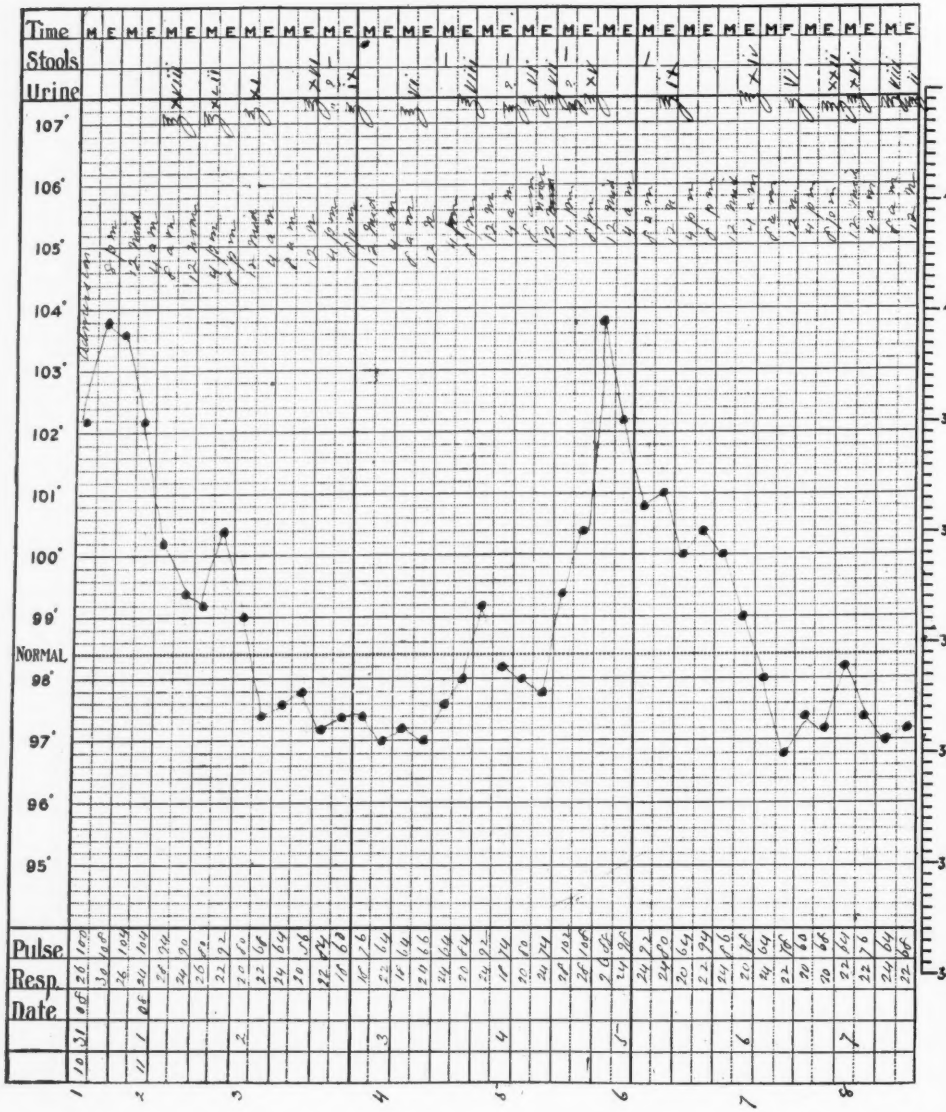
Family history: Negative.

Previous history: The child was born at term after a normal labor. He was breast fed for sixteen months. He had had measles six months before his admission. He had never had diphtheria. Ever since the attack of measles the child had complained of throat trouble.

Present trouble: Ten or twelve days before admission the mother noticed that the child refused to eat. She said that it was often necessary to stop up the child's nose so that it could swallow. If this was not done, the food would sometimes regurgitate through the nose.

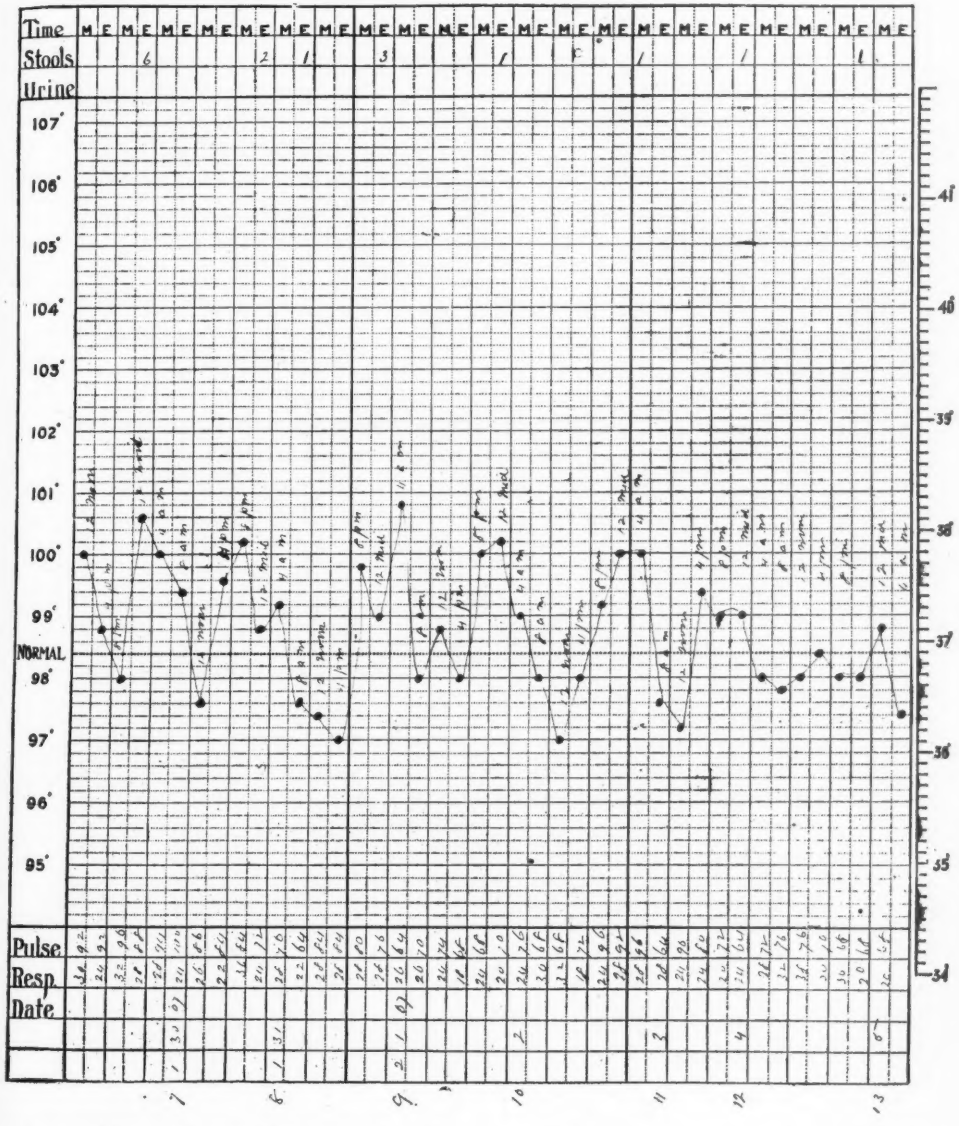
Physical examination (made by Dr. Hamill): The patient was very much emaciated; the skin was dry and very much relaxed; the superficial veins were prominent in the temporal region, on the abdomen and on the thorax; the parietal eminences were prominent; the vault of the cranium was flat; the head was square, and the fontannelles were closed. The teeth were decayed. There was

a small infected wound in the upper portion of the right ear, but no other skin abrasion. There was some edema of the feet and legs. The abdomen was distended. The spleen was palpable below the costal margin. Abdominal resistance was marked on the right side. The liver could not be palpated. There was a transmitted tympanitic note over the entire chest; breath sounds were clear. The heart's action was regular, rapid and clear. The anterior cervical lymphnodes were about the size of a bean; the posterior cervical lymphnodes were about the size of a pea; the axillary lymphnodes were about the size of a large pea; the inguinal lymphnodes were about the size of a small pea. No masses



were felt in the abdomen. A few scars were visible on the right arm and on the face which looked like the scars resulting from a local infection. There was no anal fissure and no evidence of muscular paralysis. The urine examination gave the following results: Color, light amber; reaction, acid; specific gravity, 1.011; silght amount of granular sediment composed of urates. There was no albumin and no glucose.

Blood examination:



Erythrocytes	4,250,000
Leukocytes	8,700
Ratio	1—488
Hemoglobin, per cent	50

Color Index	0.68

Differential count:

Polymorphonuclear neutrophiles	40.6 per cent
Lymphocytes	41.4 per cent
Large Mononuclears	12.8 per cent
Transitionals	1.2 per cent
Eosinophiles	2.6 per cent
Myelocytes	1.4 per cent
	100.0 per cent

No malarial parasites were found.

The second urine examination gave the following results: Color, amber; reaction, alkaline; specific gravity, 1,006; there was very little sediment, but the microscope showed numerous crystals of ammoniomagnesian phosphate. There was no albumin and no glucose.

The second blood examination gave the following results:

Erythrocytes	4,520,000
Leukocytes	10,700
Ratio	1—413
Hemoglobin, per cent	80
Color Index	0.88

Differential count:

Polymorphonuclear neutrophiles	35.4 per cent
Lymphocytes	41.8 per cent
Large Mononuclears	17.4 per cent
Transitionals	1.8 per cent
Eosinophiles	1.0 per cent
Basophiles	2.4 per cent
Myelocytes	0.2 per cent
	100.0 per cent

No malarial parasites were found.

During the patient's stay in the hospital a bacteriological examination was made of the secretion in the throat and diphtheria bacilli were found. The child's condition greatly improved, he became better nourished and, although his muscles were flabby, the knee jerks were present on both sides. There was no Babinski; the plantar reflex was more marked on the left than on the right. An examination of the eyes made by Dr. William M. Sweet showed that the pupils were clear and that they reacted normally. The occular rotations were good; the media were clear, and the fundus was normal in each eye. The patient had several attacks of crying which usually came on during the night or late in the afternoon. He had a discharge from the right ear for two days, and an examination, made by Dr. Walter Roberts, showed a double perforation of the right membrane tympani, which had been present for some time. The patient was finally discharged cured.

This is an interesting case in which a definite diagnosis was not made. The condition was one that some consultants who saw the patient with Dr. Hamill, in whose service the patient was treated, thought might be due to syphilis, but no definite conclusion concerning that point was made. The patient had a curious inability to swallow without previous diphtheritic history. During his hospital stay, however, a bacteriological examination of the secretion from the throat showed organisms resembling diphtheria bacilli. It is possible that this was a case of post-diphtheritic paralysis following a case of bacteriological diphtheria. On account of the nativity of the child, he was born in Italy, the question of malarial infection came up. There was no history of malaria obtained, but the large mononuclear leukocytes were increased on both occasions on which a diflerential count was made, 12.8 per cent at the first count, 17.4 per cent at the second count. No malarial parasites were found. The high lymphocyte percentage is, of course, accounted for by the age of the patient, two years and nine months. I think it doubtful if malaria had any relation of an etiologic nature with this case.

CASE 16. DEFINITE DIAGNOSIS NOT MADE.

Male, white, a native of Russia; was admitted to the hospital (16316) in the service of Dr. A. A. Eshner, with a diagnosis of malaria.

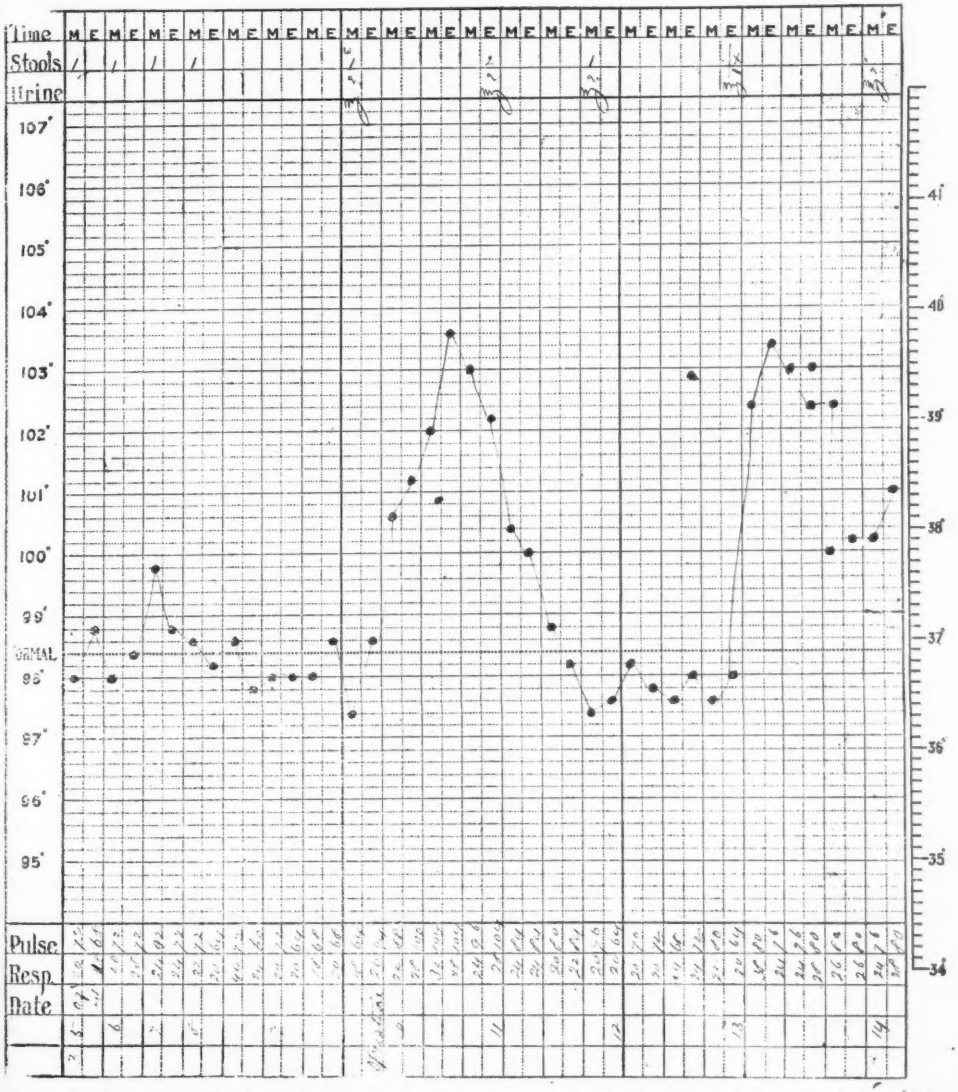
Family history: Negative.

Previous history: Negative.

Present trouble: Five weeks ago the patient began to have chills. These came on as a rule every second day and sometimes every third day. They were so severe as to shake the bed and were followed by sweat, high fever and severe headache. The last chill before admission had occurred a week previously, but the patient had had a continuous fever since that attack. His bowels had been regu-

lar; he said that his urine had contained blood, and two weeks before admission he had developed a severe pain in the hepatic region which lasted three days.

The cervical lymphnodes were enlarged on the right side but not on the left. There was a visible pulsation in the vessels of the neck. The chest was fairly well developed; the lungs



On physical examination the patient was found to be a well nourished, white, male adult, about sixty years of age. The pupils were clear and reacted to light and distance. The tongue was slightly coated and moist. were normal; the heart was normal except for a slight accentuation of the pulmonary diastolic sound; the abdomen was negative; neither the liver nor the spleen was enlarged. During his stay in the hospital the patient

perspired a great deal. Examination of his urine gave the following results: Color, amber; reaction, acid; specific gravity, 1.029; a very slight amount of sediment composed of epithelial cells and amorphous urates. There was no albumin and no glucose. The diazo reaction was positive.

Examination of the blood gave the following results:

Polymorphonuclear neutrophiles	58.6 per cent
Lymphocytes	5.4 per cent
Large mononuclears	29.6 per cent
Transitionals	2.4 per cent
Eosinophiles	2.6 per cent
Basophiles	1.4 per cent
	100.0 per cent

No malarial parasites were found. No pigmented leukocytes found. An agglutination test was made with bacillus typhosus in a 1 to 40 dilution, but was negative. An examination of the feces showed no ova, embryos, adult parasites, nor protozoa.

A second blood examination gave the following result:

Erythrocytes	4,540,000
Leukocytes	12,000
Hemoglobin (Dare), per cent	78
Ratio	1—378x
Color Index	0.85x

Differential count.

Polymorphonuclear neutrophiles	55.0 per cent
Lymphocytes	25.0 per cent
Large Mononuclears	12.5 per cent
Eosinophiles	7.5 per cent
	100.0 per cent

Erythrocytes	4,020,000
Leukocytes	11,000
Ratio	1—365x
Hemoglobin (Dare), per cent	70
Color Index	0.87x

Differential count:

Polymorphonuclear neutrophiles	58.6 per cent
Lymphocytes	5.4 per cent
Large Mononuclears	29.6 per cent
Transitionals	2.4 per cent

CONCLUSIONS.

My object in preparing and presenting this paper is to point out the conditions that are likely to be met with wherever that disease is present, which may seem on superficial examination to be due to malaria. If in a temperate climate one can meet with such diversified conditions that lead to the suspicion of the existence of malarial infection, surely in a subtropical or tropical climate, where cases of acute malaria and its sequellae are present in large numbers, problems such as those discussed in this communication will be more numerous and more difficult of solution. The point to be emphasized is that even when a clinical condition appears to be dependent upon malarial infection a careful physical examination, accompanied by a study of the condition of the blood particularly, and of the excretions and secretions in addition, will adduce important evidence to show the real nature of the case. I wish also to call attention to a method of estimating the degree of infection with malaria which appears in the detailed reports of the cases of malarial infection in the early part of the paper. By counting the number of parasites seen while one is enumerating a certain number of leukocytes, one can by making a proportion make an approximate estimation of the number of parasites in the peripheral blood of the patient. In case one there would be 1,152 parasites to the cubic millimeter of blood; in case two there would be 73,100 to the cubic millimeter; in case three, 16,992; in case five, 1,480 to the cubic millimeter.

My thanks are due to Dr. A. A. Eshner, Dr. David Riesman, Dr. R. Max Goepp, Dr. Samuel McC. Hamill, Dr. William M. Sweet, Dr. James H. McKee, and Dr. B. F. Baer for the privilege of using the clinical material made in their wards in the preparation of this paper.

THE RADICAL CURE OF MALARIA. ITS IMPORTANCE AND HOW IT IS ATTAINED.*

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(NOTE—The following article on the "Radical Cure of Malaria," was originally published in the Journal of the American Medical Association. Since then the author has repeatedly received suggestions that on account of its importance it should be republished. The present number of the Southern Medical Journal being devoted to the subject of Tropical Medicine, affords a most appropriate opportunity for such republication, and after due consideration the author has consented to its republication among the other papers to which it is germane.—H. A. Moody, M.D., Managing Editor.)

Science has almost solved the problem of malaria in all its phases; but, despite our almost complete knowledge of the life-history of the malarial parasite both in man and in the mosquito, despite our familiarity with all the manifestations of the disease, and despite the fact that every physician knows that it is easily prevented and ordinarily yields to treatment, malaria, though decreasing in severity and frequency, continues as one of the most prevalent diseases in many localities of the United States, in some places its mortality rate amounting to 25 per cent of the total number of deaths.[1]

According to the statistics obtained from the last census the number of deaths from malaria in the United States in the year 1900 was 14,909. The following states showed the greatest mortality: Arkansas leading with 1,730; then Texas, with 1,331; Alabama, 1055; Louisiana, 1,030; Georgia, 1.011; Tennessee, 987; Missouri 965; Mississippi, 938; South Carolina, 749; North Carolina, 527; Illinois, 497; Virginia, 409; Indiana, 340, and New York, 308.[2] These statistics are of questionable value, since they are largely derived from information obtained by the census enumerators in the rural districts, and no doubt many deaths reported from malaria were due to typhoid fever and other diseases. It should be remembered, however, that malaria as a complication of pregnancy and of a number of diseases, and as a cause of arteriosclerosis and nephritis, is responsible for many deaths which are ascribed to other causes. It would, therefore, seem that these statistics do not overestimate the number of lives sacrificed to this easily preventable and curable disease.

The simple statement of the number of deaths from malaria does not half tell the story of its ravages. Its expense to the people of the United States is appalling. It is estimated that malaria costs our nation from $50,000,000 to $100,000,000 annually.[3] Dr. Albert Woldert, of Tyler, Texas, after a careful study of the mortality and morbidity rates of Texas, estimates that malaria costs that state more than $5,000,000 per year.[4] Assuming that the United States census mortality rates are as correct for Missouri as for Texas, and that the morbidity rates are in the same ratio, malaria taxes the state of Missouri more than $3,000,000 annually.

MALARIA UNNECESSARY

The unnecessary burden of malaria can be relieved simply by radically curing those suffering from the disease, but, strange to relate, this most important point has been most neglected. Malaria can be entirely eradicated, in one year, in any community, if every person

*Read in the Section on Practice of Medicine of the American Medical Association, at the Sixty-first Annual Session, held at St. Louis, June, 1910.

1. Sutherland, H. L.: Gulf States Jour. Med. and Surg. and Jour. Southern Med. Assn., February, 1910.

2. Twelfth Census of the United States, Vital Statistics, 1900, i and ii.

3. Harris, Seale: Prevention of Malaria, The Journal A. M. A., Oct. 9, 1909, p. 1162.

4. Woldert, A.: Malarial Fever, Its Expense to the People of Texas, Tr. Med. Assn. Texas, 1904, p. 37.

having the disease will take quinine long enough to be completely cured.[5] It is man, and not the mosquito, that carries malaria through the winter, thus perpetuating the disease. Therefore, the most important measure in the crusade against malaria is its radical cure, and it is this phase of the subject that I shall discuss.

The average physician does not regard malaria as a serious disease. He relieves the acute symptoms in a few days and when a patient dies of malaria he feels that the patient has neglected himself. It is in the most malarial regions that the disease is most lightly regarded. We should emphasize the seriousness of the disease and the importance of its radical cure.

The complications of malaria which result from our failure to cure our patients are responsible for more deaths than the acute and pernicious forms. The manifestations of malaria, like those of syphilis, are protean, and no organ in the body is exempt from its ravages. Its most marked effect is seen on the renal organs[6] and the vascular system.[7] As a consequence, in malarial regions, the general death-rate is high and the mortality from nephritis and the various forms of paralysis is inordinately increased.

While there is certainly no relationship between malaria and syphilis, and the etiology, histology and pathology of the two diseases are widely and essentially different, yet many of the clinical manifestations are analogous. I realize that it is an "odious comparison," but it is made to emphasize the importance of the prolonged treatment of malaria.

Malaria and syphilis are general or systemic diseases, the organisms and their toxins circulating in the blood; both are inoculable; they have a definite period of incubation; in the secondary stage of syphilis there may be a fever of a remittent type (I saw a case of syphilis in the secondary stage, with daily rise of fever to 103-105 F., in which a clinical diagnosis of typhoid or malaria was made, but the laboratory proved it to be syphilis); there may be skin manifestations in malaria;[8] the tendency to chronicity is marked in both, as well as the proneness to involvement of many different organs; there may be prolonged periods of latency in malaria as in syphilis; no two diseases produce more nearly similar or more serious effects on the vascular system and renal organs; malaria is sometimes a cause of ulcerative keratitis,[9] optic neuritis, the acute psychoses,[10] sclerosis of the cord,[11] and even progressive paralysis;[12] in both diseases we have drugs which are almost specific in their action, but in order to get the best results treatment in both diseases must be begun early and continued for a long period.

Relapses, which result directly from our failure to cure our patients, may occur as recrudescenses of the fever soon after acute symptoms, as exacerbations during the chronic course of the disease, or as distinct attacks during latency. Reinfections are usually relapses or recurrences.

Celli[13] regards a relapse in malaria as the recurrence of symptoms at any time within one year from July 1. Reinfections occur after one year. Undoubtedly relapses have been observed several years after infection, and reinfections may occur in less than a year, but Celli's rule is a safe one to follow. If we adopt this rule and keep records of our cases we shall find how few of our malarial patients we radically cure.

The world owes a debt of gratitude to Manson for his self-sacrificing work in studying malaria, and he is rightly regarded as one of our greatest authorities on the disease; yet

5. Koch: Ztschr. f. Hyg., May 22, 1903.
6. Moore, J. F.: Nephritis in Malaria, Am. Med., Dec. 28, 1901.
7. Marchiafava and Bignami: Twentieth Century Practice of Medicine, William Wood & Company, New York, 1900.
8. Reissman: Am. Med., March 22, 1902.
9. Ellett, E. C.: Ophth. Rec., March, 1899.
10. Bondurant, E. D.: Unreported Cases, Mobile, Ala.
11. Spiller: Am. Jour. Med. Sc., December, 1900.
12. Marandon de Montel: Rev. de med., Nov. 10, 1900.

even he did not cure the disease in himself when first infected. He allowed himself to be inoculated by infected anophelines on September 10, 1900, and had a relapse on May 30, 1901.[14] Authentic cases of relapse after three years of latency have been reported.[15]

There would be but little chronic malaria if the acute cases were cured, but there are today probably two or three million persons in the United States who are harboring malarial parasites. Headaches, neuralgias, neuritis,[10] gastric disturbances and acute diarrhea are among the most frequent symptoms of the chronic or "masked" forms. Indeed, malaria may simulate almost any disease. Craig[16] reported fourteen cases of malaria which had been diagnosed as pulmonary tuberculosis.

TREATMENT

All authorities agree that quinine is almost specific in malaria, when treatment is begun early and continued long enough to eradicate the parasite from the system completely, though there are differences of opinion as to the time of administration, the dosage, and duration of treatment.

Given a patient in a hospital where his symptoms can be watched, and with competent microscopists who can make repeated daily examinations of the blood, the rule "no parasites, no quinine" is best; but, practically speaking, nine-tenths of the physicians, in the rural districts where malaria abounds, have not microscopes, or the time to make blood examinations; therefore, the diagnosis must be made from the symptoms and quinine administered at once. In malarial districts it is a good rule, when in doubt, to give quinine and watch for symptoms of other diseases. Quinine does but little harm in any disease, and it may do a great deal of good in eliminating malaria, which may complicate and make more serious any other disease.

The microscope is not always a criterion as to chronic malaria, because undoubtedly the disease does exist without the presence of parasites in the peripheral circulation. Now, however, that we have, in most states, laboratories connected with our state boards of health, where examination of blood is made free, and many private laboratories, where specimens may be examined for a small fee, the physician who is not equipped with a microscope should carry a few slides at all times and get a specimen of blood from cases of suspected malaria immediately before beginning the administration of quinin. He can get a report in two or three days, by telegram in twenty-four hours, if the symptoms are urgent. The few doses of quinin given before the report is received cannot injure the patient, and if the parasites are present the drug should be continued until a cure is effected.

There are differences of opinion as to the most favorable time of the day to adminster the quinin. Torti's, also called the Roman, method is giving one large dose, 15 or 20 grains, several hours before the expected paroxysm, based on the theory that the best effect of the quinin is obtained during sporulation, when the youngest forms are free in the blood-stream, has many followers in the South. Some of the older physicians still follow Sydenham's method of giving one or more large doses during the remission or intermission of the fever, when the drug is less apt to produce nausea or other discomfort. In my opinon the best method, that employed by Gorgas, Deaderick,[17] Craig,[18] Rogers[19] and other authorities, and the method which I have employed for fifteen years, is to keep the patient continuously under the influence of quinin, by giving him small doses every four hours, both day and night, with perhaps an extra dose about four hours before the expected paroxysm.

In the tertian and quartan forms 3 or 4 grains every four hours is sufficient, but in the more resistant estivo-autumnal variety 5

13. Celli: La malaria secondo le nuovo ricerche, Rome.
14. Manson: Brit. Med. Jour., July 13, 1901.
15. Ziemann: Mense's Handbuch der Tropen Krankheiten, Leipzig, 1906.
16. Craig: Med. Rec., New York, Feb. 15, 1902.

grains every four hours will be required. This dosage should be kept up for three or four days after the fever has subsided; then half the quantity should be given for two weeks. I do not believe that there is ever any occasion for giving more than 30 grains of quinin a day, and the very large doses are regarded by some authorities as positively dangerous.

In the acute and severe estivo-autumnal fevers the quinin may have to be kept up in maximum doses (30 grains daily) for several weeks, because the crescents, or gametes, are very resistant to quinin. In 1904 I reported a case of a negro girl, aged 14, who had crescents in her blood after the administration of 4 grains of quinin, in solution, every four hours for twelve days.[20] Darling, of the Canal Zone, in the Section on Practice of Medicine last year reported a number of cases in which gametes remained in the blood from two weeks to twenty-five days in spite of the daily administration of 30 grains of quinin.[21] Craig has also made extensive studies of the gametes in the peripheral circulation for varying periods of time after the use of quinin.[22]

In the acute cases of all types of malaria it is important for the patient to remain in bed for several days, because undoubtedly the best effect is obtained from quinin while the patient is at rest.

How long should the quinin be continued to attain a radical cure? Deadrick[17] says: "A few days' treatment with quinin no more cures malaria than does a few weeks' rubbing with mercury cure syphilis." He continues the quinin in 15-grain doses on two successive days of each week for two or three months. Craig, Rogers and other well-known authors also advise a modification of Koch's method.

In Italy small daily doses (6 grains) are given for three months after the acute symptoms have subsided, just as it is given to entire communities for the prophylaxis of the disease.[23] No doubt the prophylactic doses effect cures in many chronic cases, since in some localities the disease has been almost entirely eradicated and in five years the Italian death-rate from malaria has been reduced three-fifths (Thayer).

Ross[24] says: "To extirpate the parasite in a patient demands four months' assiduous cinchonization," and I believe that this is the safest rule to follow.

Thayer advises the small daily dose (6 grains) rather than the large intermittent doses. My experience has been that the small daily doses (3 grains night and morning) are efficient and are better borne than the large doses repeated at intervals of several days. I have also found that the memory test of giving quinin on certain days of the week or month is too severe for malarial patients, and they frequently give it up in disgust, while by taking it two or three times a day they form the quinin habit and will keep up the drug for even longer periods than is desired.

PROPHYLAXIS.

It is not my intention to suggest any less vigilance in destroying anopheles mosquitoes and their breeding places, and I would urge that those measures be employed to the fullest extent possible. I do maintain, however, that the most important and the most practical measure, at this time, in the crusade against malaria, is the radical cure of those harboring the parasites, because every patient cured means one less focus of infection. We should remember that there are malaria carriers as well as typhoid carriers, and that one is as dangerous to the community as the other. We should not forget that the patient with the parasites of malaria in his blood may in-

17. Deaderick: A Practical Study of Malaria, W. B. Saunders Co., 1909, p. 366.
18. Craig: The Malarial Fevers, William Wood & Company, 1909, p. 377.
19. Leonard, Rogers: Fevers in the Tropics, Oxford University Press, 1909, p. 234.
20. Harris, Seale: Therap. Gaz., Jan. 15, 1904.
21. Darling: Tr. Section on Pract. Med. A. M. A., 1909.
22. Craig, Charles F.: The Sexual Forms of the Malarial Plasmodia Occurring in the Blood of Man, Arch. Int. Med., April 15, 1910, p. 325.

fect mosquitos and thus transmit the disease to others, just as in yellow fever, and that malaria may be as serious a disease as yellow fever.

I believe that we should at once institute a campaign against malaria. It offers the most brilliant results of any of the public health problems now confronting us.[25] A campaign of education should be begun with the medical profession, because physicians as a class, and particularly those residing in malarial regions, do not appreciate the seriousness of malaria, or the ease with which it may be eradicated. The public should be educated by means of popular addresses and literature on the subject should be placed in the hands of every one residing in malarial districts. Malaria, being both infectious and contagious, should be classed as among the reportable diseases, and the state and county boards of health should lead in the fight. Municipalities, counties and states should be called on to furnish money to purchase quinin to cure the indigent sufferers from malaria and to destroy the anophelines and their breeding-places. Philanthropists should be urged to aid in this fight against one of the greatest enemies to mankind. Money spent in eradicating malaria will yield greater returns than any other philanthropy.

It is no idle dream to hope that the blot of malaria may be erased from the fair name of our Southland and from the Mississippi and Missouri valleys, where the disease is most prevalent. Our government has given us an example of what may be accomplished even in the tropics. Gorgas,[26] with the resources of our great country to aid him, when he applied the knowledge of the mosquito transmission of disease and eradicated yellow fever and malaria from Havana and the Canal Zone, made conquests which should be regarded as among the greatest in the history of the world, victories that mean more for the welfare of nations than have ever been achieved in war.

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23. Thayer: The Prophylaxis of Malaria, Jour. Southern Med. Assn., November, 1909.
24. Ross: Albutt's System of Medicine, p. 285.
25. Harris, Seale: Some Problems in Medicine which Affect the Prosperity of the South, Jour. Southern Med. Assn., April, 1909.
26. Gorgas, W. C.: Malaria in the Tropics, The Journal A. M. A., May 12, 1906, p. 1416; Ann. Rep. Dept. of Sanitation, Isthmian Canal Commission, 1908, Government Printing Office, Washington.

SOME UNDERLYING CAUSES OF THE EXISTENCE OF SOIL POLLUTION IN RURAL DISTRICTS.*

By CH. WARDELL STILES, Ph.D.,
Professor of Zoology, U. S. Public Health and Marine-Hospital Service.

Recent investigations have shown that in our rural districts there is a great amount of soil pollution, and attention is turning to this insanitary condition in connection with the campaigns that are being carried on against certain diseases, especially typhoid fever and hookworm disease.

According to a recent summary of statistics of 4,825 farmhouses, tabulated for six states, 55 per cent have no privy of any kind; of 2,499 farmhouses tabulated as occupied by whites, 35.3 per cent are without a toilet, and of 2,326 farmhouses occupied by negroes, 76.8 per cent have no privy.

The average reader may perhaps consider that the foregoing statistics of the extent of soil pollution in the rural districts are somewhat exaggerated. To this it may be replied that the conditions described are from actual observations, and attention may be invited to

*At the request of Dr. Charles P. Neil, Commissioner of Labor, an investigation into the prevalence of hookworm disease in the cotton mills was undertaken. Certain portions of the results obtained will be published in the reports to be submitted to Congress by the Bureau of Labor, while the more strictly medical discussions will be published elsewhere. The present article represents one in the series to be issued.

the further fact that no detailed account has been given of the actual condition of the privies which exist on those farms that are provided with them, nor has the point been emphasized that even when privies are present, frequently they are not used, especially by the male members of the family.

When such a widely spread custom (or lack of custom) exists, there must be some explanation for it, and in seeking to analyze the conditions the following points have come to my attention.

In the first place, while this pollution is greatest among the negroes, and among the tenant whites, it is by no means confined to them.

In a certain American college[1] there is an interesting chapter on the subject of soil pollution. It should be recalled that we are dealing here with college students, yet the President of the college told me it had been so difficult to induce certain of the boys from the country districts to use the regular water closets in the college buildings that he had been obliged to build a privy on the college campus in order to protect the campus from promiscuous fecal pollution. This privy was open in back and presented excellent opportunity for the spread of disease.

A certain United States official has recently been stationed at a certain college[1] for males. He informs me that one of the departments of this college has no toilet of any kind, and that the students practice soil pollution along the sides of the building.

A well known and very prominent educator[1] assures me from personal experience that there is a certain co-educational institution[1] for adults which had no toilet room in one of its buildings until a few years ago. Sometime ago I had personal knowledge of one other case of this kind (also a co-educational institution), and I personally witnessed soil pollution back of the dormitory.

One of the best known educators[1] of the entire country recently stated to me that about 30 per cent of the country schools of his state[1] had no privy. Personally I have seen a number of country schools and churches without privies.

A person who has made a special study of the schools in one state[1] assured me recently that in one section of that state it was the exception that country schoolhouses had a privy.

In two states[1], in the hearings of Ex-President Roosevelt's Country Life Commission, testimony was given to the effect that, as a rule, in certain districts, neither the country churches nor country schools had toilet facilities of any sort. In another state,[1] one of the state officials described the sanitary conditions on the farms as "simply atrocious;" in still another state,[1] a member of the State Board of Health described them as "awful."

Among many prominent and educated lawyers and even among physicians, I have found a prejudice in favor of promiscuous defecation.

There are, it seems, several factors which explain at least a part of this widespread disregard of sanitary precaution.

1. *Hot Climate*—With the hot summer days, the ordinary surface privy becomes a place of foul odor and filled with flies, especially if not regularly and frequently cleaned. It is, therefore, a place which a person naturally wishes to avoid, hence he naturally seeks the open, with better air.

2. *Influence of the Negro, Mexican, and Indian*—The Negroes, Mexicans, and Indians are much nearer primitive man than is the white, and it need not therefore seem strange that these races are greater soil polluters than is the white. The servant class in the South is composed almost exclusively of negroes, and the influence exerted on the white children by the negro nurse is apparent in more ways than one. It is expecting almost too much of the average negress that she will of her own accord instill into the white children ideas of personal habits which are rather foreign to her own training. Many white children are actually trained by their negro nurses into the

[1]Names and localities are purposely suppressed.

habit of soil pollution, and the habit remains with them, to some extent, in later life.

3. *Influence of Hookworm Disease*—A person who has a severe infection of hookworm disease is not predisposed to making any unnecessary effort to find a privy when a more or less secluded spot may offer to him a safe retreat. While soil pollution favors hookworm disease, the converse is also true; hookworm disease favors soil pollution.

4. *Economy*—If one visits the hovels in which many of the rural tenants live, one is seriously impressed by their inferior condition. It is not very uncommon to find a family living in a one-room or two-room hovel, and in many instances the entire family, including brothers and sisters from 1 to 18 years of age, or older, eat and sleep in one and the same room. The same conditions of poverty that give rise to such economy would naturally result in economy in respect to building privies.

5. *Economy in Time and Work.*—A poorly kept privy is not only an eyesore, but is an exceedingly unpleasant thing to have near a house. To avoid this unpleasantness, it is necessary to clean the privy regularly. This takes both time and work, and it is not a prominent characteristic among either the rural white tenants or the Negroes, Mexicans, and Indians, to devote any special amount of time to work which is not only disagreeable, but for which they see no necessity.

6. *Popular Beliefs*—There seems to be a more or less widespread idea among these country people that it is much better to scatter the night soil around than to collect it in one place. Two alleged advantages occur to their minds in support of this view, namely: (a) it is thought that the action of the sun is a powerful factor in destroying any injurious effects arising from night soil; and (b) it is thought that the night soil is valuable as fertilizer.

The first idea (a) is not without a certain amount of foundation; still, as a practical fact, people are prone to defecate in shaded places, hence the sun is not likely to exercise its disinfecting influence; further, the fact of the escape of thousands of hookworm embryos into the soil, whereby they avoid the action of the sun, is unknown to these people.

As for the second idea (b), without going into the question whether night soil is such a valuable fertilizer as is popularly supposed, the point may be raised that if the material is allowed to ferment sufficiently long or is boiled before being on the ground, the sanitary dangers involved are avoided.

7. *Popular Ignorance Regarding Sanitary Matters*—There is a widespread ignorance as to what constitute proper sanitary conditions, and this ignorance is especially marked among government employees, free delivery men (especially postoffice employees), and farmers. Thus in a recent inquiry the fact was developed that of 77,127 persons, 56,893 persons, or 73.7 per cent were unqualifiedly satisfied with their sanitary surroundings (despite a nation-wide typhoid death rate of 46.5 deaths per 100,000 inhabitants, according to the twelfth census)!

8. *Low Rental of Farms*—Many of the tenant farms are not giving the returns which the landlords think they should, and the owners are not therefore inclined to expend more money for improvements than seems necessary to them. As their knowledge of the dangers of soil pollution is not much greater than the knowledge possessed by the tenants, the necessity for the building of sanitary privies is not apparent to the owner.

9. *Privacy*—As the popular conception of a privy is that it is a place for privacy, and as the chances for privacy are greater in sparsely populated areas, as away from the main roads, than in more densely populated localities, the popularly accepted reason for the existence of a privy is not self-evident to the inhabitants in the outlying districts.

From the foregoing it may be seen that soil pollution can, at least to some extent, be explained, and the very fact that there are certain definite reasons which tend to keep the

custom alive shows us the importance of conducting an intelligent campaign against this pernicious evil.

Soil pollution is in the nature of *"malum in se";* it is an "aggravated offense against the public welfare;" *ergo,* it should be made a "crime," and as such it should be punished by law.

THE QUICK MACROSCOPIC TYPHOID AGGLUTATION TEST, ITS APPLICATION AND ADVANTAGES.

By C. C. BASS, M.D.,
New Orleans, La.

At the 1909 meeting of this association John A. Watkins demonstrated a quick macroscopic typhoid agglutination test which we had devised, whereby it was practical to make an agglutination test at the bedside of the patient, in less than two minutes, and without laboratory experience or equipment except a microscope slide or other piece of glass and a proper suspension of dead typhoid bacilli and having the same value and indications as the standard Widal's reaction. Since that time we have published, jointly (Archives of Internal Medicine, Dec., 1910), in detail, the principles involved permitting the improvement, such information as we have gained relative to the preparation of typhoid suspensions for this purpose, certain further slight simplifications in the technic of making the test, and the findings of a number of physicians who have kindly tried the test out for us with especial reference to its practicability for general practitioners. I desire to further call attention to the application and advantages of the test over all other methods of making typhoid agglutination tests, not only for general practitioners, but for laboratory workers as well.

It may be well to briefly recall the principles involved in agglutination tests and to repeat explanations already given as to the quantities employed in our test. Any agglutination reaction is produced by the action of the agglutinin in the serum tested on the bacteria employed, whereby they are sensitized and attracted to each other. For convenience in discussion we take as a unit of agglutinin that quantity necessary to completely sensitize one million typhoid bacilli and as a unit of bacilli one million typhoid bacilli.

If we add to a series of tubes containing increasing quantities of salt solution (or water), from the smallest quantity upward, an equal number of bacilli units and agglutin in units, and after a few minutes remove the bacilli from each by centrifuging, it is found on appropriate test that all the agglutinin has been removed and therefore taken up by the bacilli from the most concentrated mixtures. But an amount remains in the more dilute mixtures—which amount increases with the dilution. This shows that the more concentrated the mixture of bacteria and agglutinin, the more rapidly are the bacteria sensitized, and vice versa. Naturally we would expect this when we consider the fact that many of the agglutinin molecules must travel over geometrically increasing distances to reach and affect the bacteria as the dilution increases. We can conceive of a dilution being so great that sensitization could not occur in it at all, and this is easily demonstrable to be true by test tube experiment. Not only is sensitization delayed in geometric proportion to the dilution but clumping, or agglutination is also delayed in the same proportion.

This is also easily demonstrable. To two tubes add an equal quantity of bacilli units. To one, add one volume of diluting fluid (water or salt solution), and to the other twenty volumes. Now to the first tube add agglutinin units equal to the number of bacilli

units and to the second one add twenty times as many agglutinin units, so as to furnish agglutinin equally available to the bacilli and to assure sensitization of the bacilli in each. It will be observed that clumping is delayed by the dilution, even in the presence of twenty times as much agglutinin, and if we carry the dilution high enough agglutination is prevented entirely. It is therefore apparent that the more concentrated the agglutination mixture, the more rapidly will agglutination take place, and vice versa; and inasmuch as rapidity is very desirable for practical purposes, we have endeavored to use the most concentrated suspension of bacteria and serum that would be most practical for general use, and always to have the amount of serum used per bacillus to conform as nearly as possible to the amount used in the usual Widal's reaction.

It is not easy for general practitioners not trained in laboratory work to collect blood and obtain serum to test. As is generally well known, whole blood may be employed for agglutination tests in place of serum, provided the cells are dissolved. One volume of blood readily dissolves into a clear solution in four volumes of water, but less than four volumes of water per volume of blood cannot always be depended upon to give perfect and rapid solutions of the blood. We employ, therefore, blood diluted five times.

A 24-hour broth culture of typhoid bacilli with which the standard Widal's reaction is usually made contains a very variable number of bacilli ranging in estimates, I have made from 150 millions to 1,500 millions per cc. We estimate that a mixture of equal quantities of blood diluted five times, and a suspension of 10,000 million bacilli per cc. allows approximately the same amount of serum per bacillus as is applied to each bacillus in the standard Widal's reaction, viz, one fifty-billionth cc. of serum per bacillus.

Though there may be good reasons for varying the proportions of blood and bacilli from those generally employed in making a Widal's reaction, we have not ventured to do so, and do not believe it would be warranted to change standards that have been employed and found satisfactory so many years, unless such change were justified by most extensive clinical trial.

The test fluid that we employ consists of ten thousand million dead typhoid bacilli in 1 7-10 per cent sodium chloride solution to which 1 per cent formalin is added to kill the bacilli and for preservative.

Any competent bacteriologist can make this bacterial suspension. The bacilli are washed off of the surface of large twenty-four-hour old agar slant cultures of typhoid bacilli, with 1 7-10 per cent salt solution. The number of bacilli per cc. is determined in the usual manner for standardizing bacterial suspensions and "vaccines" in general, and the whole appropriately diluted to contain ten thousand million per cc. Finally 1 per cent of commercial formalin is added.

This material does not seem to lose its serviceability from age. I have some now nearly five years old that is, so far as I can tell, as good as it was when first made. On account of these keeping qualities and the ease of preparation I see no reason why this reagent should not be sold in the stores as other reagents and drugs are.

The general rule for making the test is to dilute the blood five times by adding four volumes of water to one of blood. A good practical way to make this dilution is to let flow one drop of blood from the ear or finger into a tube or bottle containing four drops of water. Any specimen of blood, wet or dry, fresh or old, may be diluted with approximately four times as much water as the original volume of water appears to have been when fresh. One drop of this diluted blood is mixed with one drop of the test fluid on a microscopic slide. The slide is tilted from side to side or from end to end so as to mix and agitate the mixture and thereby hasten agglutination. A still better and more practical way of making the test is to make a smear on a slide of approximately one-fourth

drop of blood and to dissolve this on the slide with one drop of water which makes an approximate dilution of one to five. To this is added one drop of the typhoid bacilli suspension and the reaction determined in the usual way. One-fourth drop of blood is about the quantity used to make an ordinary smear for examination for malaria or differential count, and these smears properly made, serve perfectly for the agglutination test. There is a little sacrifice of accuracy in the dilution, but on account of the considerable variability of all other agglutination tests due to variation in the strength of the cultures used, the comparative value is not reduced. The proper quantity (1-4 drop) is welled up by squeezing the ear or finger after sticking with a surgical needle or other blood sticker. This is taken up by touching it with a slide. It is then spread out with another slide and dissolved with one drop of water.

The reaction when positive appears within one or two minutes and consists of the appearance of a fine sediment, composed of agglutinated bacilli, visible to the unaided eye. This rapidly becomes coarser and coarser as the agitation is continued. Where the amount of agglutinin is very small the reaction may be weak or doubtful. This is true, however, with all other tests for other substances when present in very small quantities. It is true of tests for alubumin. When the test is negative no such sediment is formed, and the mixture remains clear and unchanged. When one has seen a few positive reactions, he experiences little or no difficulty afterward in determining whether a reaction is positive or negative. One source of erroneous findings with those who have never seen a positive reaction, is that they will sometimes mistake dust or trash on a dirty slide for the sediment looked for. This should not occur after one or two positive reactions have been seen.

In devising the test we have desired especially to make it quick, macroscopic and practical for general practitioners. To what extent the test is practicable will be indicated by the reports we have received from 128 physicians who have kindly tried the test for us and reported relative thereto. A few of the letters and communications could not be tabulated. The vast majority stated that they were able to use the test perfectly satisfactorily and that the clinical course of the cases tested bore out the findings. A few letters showed or stated that the physician had not been able to get reactions that were not doubtful or unreliable. Two men report three cases of positive Widal and negative macroscopic reaction. Of the 652 cases tested by these physicians to date that can be tabulated 363 were on cases the subsequent histories of which proved they were typhoid, and 289 were on non-typhoid cases. Of the 363 typhoid cases 322 gave positive reactions and 41 negative. Of the 289 non-typhoid cases 32 were thought to be positive. A few of these were diagnosed as continued malarial fever or had previously had typhoid fever.

On the whole the reports show that although the test is perfectly practical in the hands of the vast majority of physicians a few cannot make the test properly or else the test is unreliable. It is probable that no better showing would be made, however, by an equal number of physicians making so simple a test as Heller's test for albumin or Fehling's test for sugar.

As for the few instances so far reported in which the Widal and our macroscopic test did not agree, the question may as well be asked whether the method of making the Widal may not have been at fault. In several hundred comparisons during our own experiments the two tests always agreed.

The practicability of our test must be determined by the general practitioner, while its reliability may be determined by laboratory workers, and those more or less familiar with laboratory technic.

The advantages of the test may be briefly stated as follows:

It offers to every general practitioner a reliable agglutination test that may be made

at the bedside in two minutes practically without expense, or any considerable experience. At the bedside or time of consultation is when the information furnished by an agglutination test is most desirable. This is very much better than sending a specimen of blood off to a laboratory and waiting hours or days for a report. On account of its convenience it is practical to make tests as often as desired as long as such tests are indicated by the nature of the case, and until the diagnosis has been made.

The advantages to the laboratory worker are chiefly convenience and the saving of time —two minutes in place of half an hour—and the relief from the necessity of preparing cultures every day for the tests that may be made the following day, as Widal's reaction requires. Finally there should be mentioned the advantage of making all tests with a definite strength, invariable bacterial suspension in place of with living cultures which vary from day to day in their strength, and in their likelihood to contain pre-formed clumps.

In conclusion I desire to emphasize that we claim for our test only that it is a simpler, more convenient, and more practical method of making the typhoid agglutination test, but that its interpretation and clinical value is exactly the same as that of the Widal's reaction.

741 Carondelet Street.

DISCUSSION.

Dr. Henson—"The test will appeal to those of you on the seaboard. The differentiation of typhoid and aestivo-autumnal malaria is impossible without the microscope. It is hard on those who have none, but with this Bass test it is going to be a simple matter now to differentiate at the bedside, and I think the profession owes Dr. Bass great thanks for this differentiation."

Dr. White—"I can add to this testimonial. Dr. Bass is not only an able clinician, but a bacteriologist and a competent judge of such things. I have heard of him in the most glowing terms, and I am glad he has brought his test before this society as one of the recent advances in medical science."

Dr. Bass, closing—"Someone asked how early could we determine with this test. If our observations are correct, it can be made and the changes observed on the same day that the Widal can be obtained. Usually about 7 to 10 days, about 75 per cent during the second week, and 90 per cent during the disease. The employment of this method gives an agglutination test for the general practician at the bedside, without experience or technical training. Dr. Krauss was right, as such a man as he must reserve his opinion before trying out new things. I believe the dilution of the bacteria is more important than the dilution of the serum. By actual count I have found cultures to vary from 150 millions to 1,500 millions to the c.c. The agglutinin is a quantitative thing we are testing for. Another very important thing comes up in the practice of making the agglutination test. Some use a 24-hour broth, and some use a culture washed from agar slants and diluted until it looks like the proper strength. I have tried very hard to guess at the strength of an emulsion, and I find I cannot tell within two or three times as to what it is. We cannot guess the number of typhoid bacilli in an emulsion. Typhoid bacilli on surface agar are non-motile, and if we wait until the second generation we find they are motile. They adjust themselves to circumstances and surroundings, and when they have no fluid to swim in, they soon cease to grow the flagellae. Non-motile bacilli in a weak solution will agglutinate slower than those with flagellae. They have an affinity for each other when sensitized with typhoid serum, and that is what make them stick together. As to dilution. Our dilution is about 1 to 5. One drop of blood being diluted about five times. We have tried this test with a number of other bacteria, and find it applies to others—*i. e.,* parotyphoid, colon bacillus, and tubercle bacillus. The agglutination takes place more readily by flowing the fluid over the slide, making the emulsion any better than any good laboratory man can."

WHAT IS HEAT EXHAUSTION?*

By P. A. Surgeon, W. H. RENNIE,
U. S. Navy.

Gentlemen: All attacks of heat resolve themselves into three classes.

Sunstroke, caused by the actinic rays of the sun in the physically enfeebled. During the hot season one already fatigued, and perhaps with arteries sclerosed, experiences a sudden collapse, or a more gradual inset, with flushed face, headache, rise of temperature, quick, full pulse, syncope and paralysis of heart and respiration as is found in cases of shock. Death may be almost immediate; or develop a train of symptoms of persistently recurring headaches, mental irritability, hypersensitiveness to heat, light and sound, delirium, restlessness and sleeplessness, nausea, loss of memory, intellectual impairment, tremor, convulsions, etc.

Of the second class, Siriasis, Manson says: "It is well known that neither high atmospheric temperature per se, nor high bodily temperature, unless the latter be associated with some special toxins, gives rise to symptoms at all like those of Siriasis. Considering these two facts, and at the same time the peculiar and capricious distribution of the disease, the circumstances that its prevalence curve does not always correspond with the atmospheric temperature curve; that the degree of prevalence varies in the endemic area from year to year; that it is not most prevalent in the hottest years, seasons, or places; that it becomes epidemic at times; that it runs a definite course; that it may relapse; that in many instances it has definite premonitory symptoms; that it has peculiar lesions and that it tends to terminate by crisis; in other words, that it behaves like pneumonia or any other specific fever. Sambon has boldly asserted that Siriasis is a germ disease, like Yellow Fever or Dengue, and like these is caused by some organism which demands for its development a high atmospheric temperature and certain, as yet unknown, local conditions."

The third class of cases, of greatest interest and importance to the Medical Officers of the U. S. Navy, never occurs except in the presence of high artificial temperature in confined quarters and without proper ventilation, but are we justified in assuming great heat to be the essential cause, rather than a necessarily concomitant one? Is heat alone sufficient to produce the train of symptoms whose complex is recognized as Heat Exhaustion? It is of daily observation that many men expose themselves to this exciting cause without the appearance of any suspicion of trouble whatever, yet many a man, as in seasickness, will resist such attacks for years only to succumb at last.

This is absolute proof that heat alone will not succeed in so overtaking a man in health. Let me describe a case of ordinary severity:

A man in apparent health at work in the fireroom for a longer or shorter period of time, and at any minute of his four-hour watch, is suddenly, for the most part, overcome with weakness, cold, clammy skin, staggering blindness, and falls prostrate, with or without cramps; his shipmates remove him from the heat, transporting him to the sick bay, where he receives stimulation and applications of heat; his pulse is weak and rapid, and in fact is a picture of the classic collapse. In a few hours, 24 hours at the most, he has recovered and, in all likelihood, returned to his work in the fireroom below. Was this man unknowingly below par that he could not withstand the customary exposure to the same degree of heat? Certainly muscular fatigue cannot be asserted as the cause, because it may occur in the beginning of a watch. Intemperance, likewise, has been assigned as the forerunner, then how explain the attacks in men some days at sea, or in men of known habits of sobriety? Oft times some disturb-

*Read at the Seventh Annual Meeting of the American Society of Tropical Medicine, St. Louis, Mo., 1910.

ance of the stomach or intestinal tract has been suspected, yet we have cases where no such trace has, at least, been discoverable.

Medical Inspector Oliver Diehl, U. S. Navy, reports in the U. S. Naval Medical Bulletin for April, 1910, the case of a man becoming unconscious for a few minutes with free perspiration, dilated pupils, pulse soft and accelerated, no convulsions or cramps; the temperature of the fireroom was 115°F; the man returned to duty the following day. Also another similar case, with an added oppression and pain in the anterior chest. No cause is here assigned; the temperature of the fireroom was only 115° F.

In the annual report of the Surgeon General, U. S. Navy, for 1909, P. A. Surgeon G. H. Hathaway, U. S. Navy, says: "During the standardization runs of the U. S. S. Cheyenne at maximum speed the temperature in the fireroom rose to 140° F which is about 10° higher than under previous similar conditions when burning coal. Nevertheless in the higher temperature no case of heat prostration occurred, nor during the cruise has any member of the engineer's force succumbed to the heat. It is thought that the slight amount of physical exertion required to regulate the burners, as compared to passing coal, enables the fireroom watch to withstand a greater elevation of temperature. While cruising the fireroom force is reduced to about one-half those for coal fuel, which is of some sanitary advantage." This case would infer muscular fatigue and crowding as conducive to attacks.

In the April, 1910, number of the U. S. Naval Medical Bulletin, Surgeon J. T. Kennedy, U. S. Navy, speaking of heat cases on board the U. S. S. Colorado, says: "There had been no sickness or prolonged cruising to depress vitality; temperature only 120, modified by forced draft and a low relative humidity, so that heat exhaustion, like seasickness, would seem to be the expression of a body seeking to adjust itself to an environment, the symptoms resulting from the temporary lack of adjustment. Since that time no cases have appeared, although the ship has sailed under worse conditions of heat and oppression, coaling has gone on under burning skies, and fatigue and depression incident to hard work and little play has been the rule." Thus sustaining just the contrary opinion of the former case.

Assistant Surgeon M. E. Higgins, U. S. Navy, in the April number of the Naval Medical Bulletin, 1910, quotes a case in a man 38 years of age, in excellent health during his 18 years in the fireroom: "He has a moderate arteriosclerosis with thickened radicals and high tension pulse, having used alcohol for years and frequently to excess. On the day of his attack the temperature of the fireroom was 130° F. About 2 P. M. he was brought to the sick bay suffering with severe muscular cramps, involving especially the abdominal muscles and the flexers of the extremities. The cramps were tonic spasms lasting for several minutes. Any change of position or voluntary movement was sufficient to precipitate a spasm of one or more muscle groups, the pain in the affected muscles was agonizing in character. When first seen the man was sweating profusely, and he continued to sweat for several hours. I have never seen a more violent or prolonged perspiration. The pulse was 130, of high tension; temperature 98° F, respiration 20. The tongue was dry and heavily coated. There were no cerebral symptoms. In six hours the cramps had entirely ceased, and with the exception of a sense of soreness in the affected muscles, which persisted for several days, the patient was comfortable. No urine was passed until the following morning, when he voided 250 c. c., Sp. gr. 1020 and high color. Heller's test gave a thick ring of albumin, and there were many finely granular casts. On the second day there appeared but a trace of albumin and a few casts. Five days later neither casts nor albumin were present and subsequent examinations have shown the same result. As Dr. Higgins remarks, the presence of albumin and casts in the urine, and free perspiration are

not the rule. This man was an alcoholic for years and of long service in the fireroom.

During the cruise of the battleship fleet around the world, not a few cases occurred. Sixteen of these were studied by Surgeon A. G. Grunwell, U. S. Navy, on board the U. S. S. Kentucky; in his report we find the attacks occurred in July in tropical waters, and because of rough weather, the confined air was vitiated by the closing of the hatches. In most cases he found some disturbance of the pastro-intestinal tract (toxaemia), and advances the belief that "we need look no further than the tetanus bacillus for the production of the poison" which is absorbed from the intestinal tract.

The gravest and most interesting case, which by the way did not happen in the fireroom, was that of a private marine while coaling ship in Manila, P. I., about 6:30 in the morning. "A large, powerful and apparently healthy man of 22 years, was suddenly stricken, while wheeling coal on deck, with vertigo and violent headache. He was carried up on the bridge in the open air, and when he was seen a few minutes later convulsive twitchings had commenced. These increased rapidly in severity, becoming general tonic spasms and were in all respects so similar to the spasms of tetanus that, except for the etiology and the absence of wounds or the history of any, a diagnosis of that disease would have been made without hesitation. When fully established, the spasms seemed always to begin in the face, spreading in regular order to the neck and chest, then becoming general. Often this succession would occur with great rapidity, though sometimes risus sardonicus, and the occurrence of intermittent spasmodic contractures of the pectorals and diaphram would give warning of the approach of a general tetanic seizure. As improvement set in the spasms also abated in regular order, risus and the twitching of the pectorals being the last to disappear. During the height of the seizures, the spasms were very painful, and a marked tendency to opisthotonus was shown. There was, also, double convergent squint, the pupils being evenly, moderately contracted. Headache was excruciating and consciousness was never lost, though he became decidedly somnolent at times, probably from the effects of the morphine and chloroform administered to control spasms. Throughout the pulse was full, strong, and regular, ranging from 60 to 74 beats per minute, and the temperature never rose above 100° F, either by axilla or mouth. Once only did vomiting occur, and then in the evening, after the administration of a small quantity of water, in spite of the fact that small quantities of not very cold water had been given from time to time during the day and retained. The tongue was slightly coated. It was very noticeable that currents of air, a touch, sudden noises, etc., were liable to, and usually did, produce a spasm, as in tetanus. The convulsions were readily controlled by a few inhalations of chloroform, after the administration of morphine. During the afternoon, the convulsions gradually subsiding, the patient passed a comparatively quiet night, without spasms and with considerable sleep. The next morning he complained of pain in his jaws, which were a little swollen and of toothache and headache. He was left in the open air during the night, but with the morning a steady rain set in necessitating his removal below to the sick bay where it was close and hot. Shortly after his removal to the sick bay slight spasms reappeared, upon which he was quickly transferred ashore." At the time of this man's attack, 7 A. M., the temperature in the open air was 82° F.

Dr. Grunwell calls attention to the sudden high temperature in some cases of malarial fever, and the absence of attacks in the hot dynamo room.

With this brief review, gentlemen, the question remains, What is Heat Exhaustion?

THE PROGRESS MADE IN INTESTINAL SURGERY, WITH A DEMONSTRATION OF A NEW METHOD OF SUTURING THE BOWEL.*

By A. E. BENJAMIN, M.D.,
Minneapolis, Minn.

(Published simultaneously in the Southern Medical Journal and the Lancet-Clinic of Cincinnati.)

Ever since it was found that the abdomen could be safely invaded to attack disease the intestines have received considerable attention. Much effort has been put forth to establish a simple, safe and satisfactory method of resection of the bowel and of intestinal anastomosis. The advancement has been rapid. The progress resulted from deductions made by careful clinical observations, strict asepsis, improved manipulative skill and also from a clearer understanding of anatomy, physiology, bacteriology and biology and of the vital processes concerned in all lesions within the abdomen.

The recognition of the wonderful powers of repair possessed by the peritoneum when unsoiled by septic matter, greatly changed the operative technique and convinced the surgeon that in this tissue he had a great ally.

Innumerable operations for appendicitis, of the suppurative character, demonstrated that the peritoneum was often able to care for and protect the contiguous organs; that the hyperemia from bacterial irritation was beneficial and the greatest antagonists of disease were the leucocytes or phagocytes contained in the excess of serum present.

Thus by degrees bacteriology and biology have furnished us with explanations of the facts observed in clinical study and we have come to know something more definite about the defensive powers of the serous membranes.

This development of the subject has gone hand in hand with the study of phagocytosis, cytolysis and of antibodies or opsonins in blood.

Clinicians found a healthy bowel did not permit of the migration of the bacteria through its walls. This fact so modified the surgeons' work that the least possible trauma and handling of the bowel was practiced and strict asepsis was observed at the time of operation.

These discoveries also prompted the surgeon to lessen as much as possible the number of bacteria within the canal by the administration of laxatives, to use sterile foods, to wash out the stomach and to thoroughly clean the mouth, teeth, nares and pharynx in advance of an operation upon the stomach or bowel.

The greater purity of our anaesthetics of to-day and the improved method of their administration has also contributed much toward the successful outcome and also lessened the death rate.

In the early history of abdominal surgery many exploratory operations were performed. In some an obstruction of the bowels was found, in others a diseased appendix or a cancerous growth removed. Where much tissue was involved often nothing was done to remove the disease, the abdomen being immediately closed. Success crowned the efforts of the surgeon in many of these cases, however, and some demanding a resection or anastomosis were cured. Successful results stimulated the profession to do and dare more and in such case they endeavored to improve their previous methods. Reasons for failures as well as successes were analyzed. Statistics were studied and cases carefully watched.

One cause after another of bad results was overcome. As the profession became more thoroughly versed in the science of bacteriology the element of contamination and infection was observed to enter into the work not a little. How to perfect the technique and prevent the bowel contents from infecting the wound or escaping into the abdominal cavity became vital questions.

Failures often occurred because the anas-

*Read by title before the Mississippi Valley Medical Association, Detroit, Sept. 13-15, 1910.

tomotic opening did not remain sufficiently patent. When the suture method was employed for the anastomosis, pursing resulted, and when this happened shortly after the operation the distended intestine above this point soon weakened the suture line, resulting in a leakage with local or general peritonitis.

To maintain a constant communication between these loops of intestines and yet hold the parts in apposition sufficiently long for union of the contiguous surfaces and have a sufficient opening thereafter was first worked out by Dr. J. B. Murphy in the nature of a button which permitted rapid work (then not an unimportant element in the success of these surgical procedures.) This button allowed the passage of liquids and gases from the proximal to the distal loop and prevented any leakage by its firm and constant hold upon the opposing membranes. It was water tight.

Many other appliances have been used, such as Senn's bone plates, cylinders of magnesia, bobbins, etc. Also many instruments, such as La Place's forceps, were invented and used by their inventors and their followers with a considerable degree of success. When, from frequent experiments, it was found that structures healed best, when united to their kind and especially the serous coats of the intestines, the object of uniting these tissues in the most simple and safe way possible was carefully studied by numerous surgeons until at the present time so successful have the operators become by the use of the thread and needle alone, that nearly all of the appliances, instruments, etc., have been discarded for this simple but efficient means.

The bowel clamps for holding back the bowel contents and steadying the viscus while the work is being done are about the only special appliances now used by surgeons.

It is now conceded that the general condition of the patient and the local condition of the parts involved should be in as favorable a state as possible consistent with the exigencies of the case. The haemoglobin should be raised to a safe limit for operation, the leucocyte count should approach the normal, the alimentary canal as free from bacteria as possible, the temperature and pulse should be brought near normal and the kidneys should be functionating properly. In emergency cases all this is not possible. In many cases, however, all this could be practiced and success would more frequently result. Little consideration was given these factors in early bowel surgery. Success to-day depends much upon them.

Surgeons can hardly understand the attitude of the early operators toward the now important element, viz.: surgical cleanliness. Physicians in ancient times recognized the contagiousness of many epidemic diseases, and why the same thought was not earlier advanced with respect to surgical diseases seems strange. When the idea did occur to them and it was positively proven that disease micro-organisms are destroyers of health, some of these within our own bodies, but inhibited in their activities by a limiting membrane, the success of this branch of medicine was assured and the progress marvelous. At the present time the personal equation of each operator in respect to this element determines in a great measure his own success and the percentage of his recoveries.

The rapidity and dexterity and accuracy with which all operations are performed are important elements making for success. The initial work on the intestines was crude and unskillfully performed, often due to lack of practice. I believe every operator should have done a great many operations upon the lower animals before attempting work upon human beings. He should be conscientious, painstaking and careful and by nature have a mechanical mind and be "handy with tools." He should be cut out for a surgeon and must like the work. If not, no amount of training will properly fit him to take his part in this most responsible field of the healing art. If he has the inherent qualities of a surgeon, this practice upon the lower animals, with needle and thread, will fit him more perfectly for his life work.

There has been much controversy over the method and manner of uniting two loops of

intestines. It would seem, however, that few men now would select any but a side anastomosis, where that one is possible, as the blood supply is much better, the opening can be made larger and the anastomosis is more secure and accurate, and it gives a greater percentage of recoveries.

Silk was the first suture material used on intestinal work and has been employed for bowel anastomosis more than any other material, but Pagenstecher thread is now frequently employed and makes a good substitute.

Since we are able to produce a sterile catgut and one which will last a sufficient length of time for union of the intestines to occur, this suture material should have more consideration.

In several experimental operations upon the lower animals, the author has from time to time demonstrated its advantages and security. In fact, the use of chromic catgut for both lines of sutures has been followed by perfect results in every instance when carefully employed.

In practice chromic catgut for appendicial work, to turn in gastric ulcers, and to repair small feacal fistulae has proved to be a safe suture. In most cases of gastroenterostomy, or bowel resection, the Pagenstecher has been used within and the chromic catgut without with satisfactory results.

When non-absorbable sutures are used, they are exposed to the encroachment of the omentum or loops of bowel and numerous adhesions may form, especially if infection occurs.

It frequently happens that where a non-absorbable purse string suture is used for the appendix it causes great distress, many adhesions, lessened bowel activity, obstruction, or abscesses, necessitating further surgical work. In other words, the foreign substance acts as a constant irritant, against which the tissues rebel, causing no end of trouble at times.

Since the ideal result of an intestinal anastomosis is secured when there is in due time an expulsion of the non-absorbable sutures into the lumen, a method which most facilitates the acomplishment of such a result is to be favored. The nearer the suture line to the lumen of the bowel the more likely does this early sloughing take place. There is not the loss of so much bowel tissue, nor the overproduction of plastic exudate, when the non-absorbable suture is confined to the inner layer.

The various sutures employed in intestinal work from time to time, such as the interrupted single suture, mattress interrupted, Lembert's, Cushing's, Halstead,'s, Connell's, Czerney's, etc., have been faithfully tried and some have stood the test fairly well. With the idea that a continuous suture might be so employed that it could be quickly introduced and still prevent leakage or pursing and would prevent infection and hemorrhage and securely approximate the opposing surfaces and cause no strangulation, the author found by experimental work upon dogs that a cross back-lock stitch met these requirements.

The stitch consists in making an overstitch of the Lembert type on the serosa, Fig. 4, and a Cushings or a through and through stitch when introduced with the mucose exposed, Figs. 2 and 3, with a backward stitch between the last two sutures, locking each and coming out on the opposite side a little in front of the last forward stitch. It allows no leakage or separation of tissue. The suture line does not loosen up if one stitch cuts out.

The inner suture line is the important one for the reason that it is completed first and determines the size of the opening between the loops of intestines. It is the one which controls hemorrhage, and should not permit temporary leakage or infection of the outer suture stitch. The backward lock stitch is thus very effective, and when surrounded by a chromic catgut Lembert suture an ideal result may be expected.

The outer suture of chromic catgut is absorbed and the inner or Pagenstecher's thread in due time sloughs into the bowel, leaving no

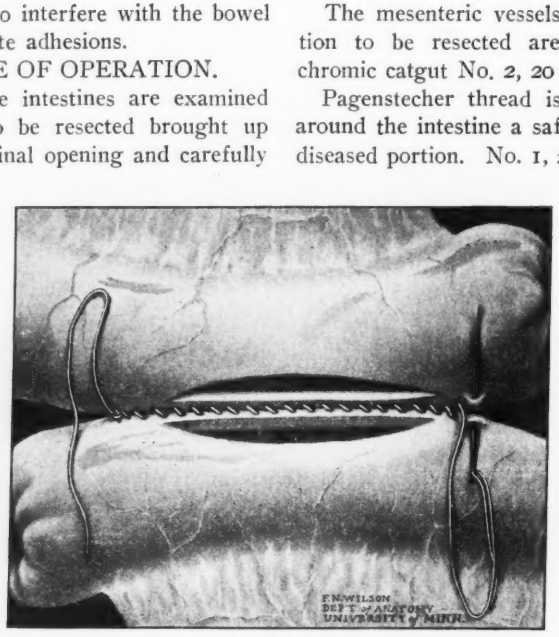
foreign substance to interfere with the bowel action or to promote adhesions.

TECHNIQUE OF OPERATION.

The loops of the intestines are examined and the portion to be resected brought up through the abdominal opening and carefully

The mesenteric vessels supplying the portion to be resected are now ligated with chromic catgut No. 2, 20 day.

Pagenstecher thread is next tied securely around the intestine a safe distance from the diseased portion. No. 1, 20 day, chromic cat-



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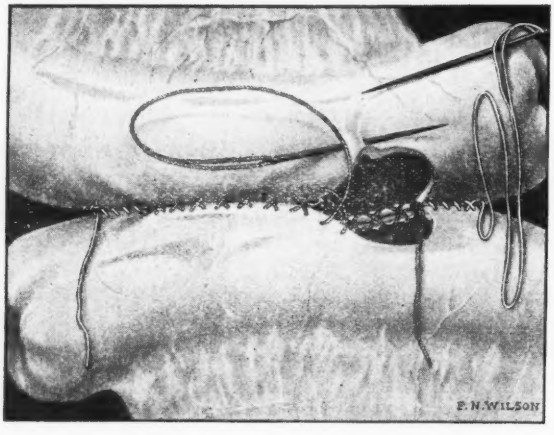

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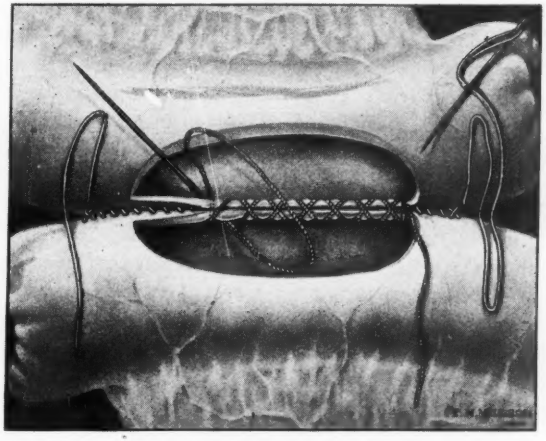
surrounded with moist gauze. All bowel contents are pushed back to a safe distance and bowel clamps armed with rubber are placed upon the intestinal loops at a sufficient distance to allow enough bowel tissue to be used for the anastomosis.

gut as a purse string suture is placed three-fourths of an inch below the Pagenstecher ligature.

Clamps are placed on the ends of the diseased segment one-half inch from the ligatures, while other clamps steady the bowel near

the constricting suture. The bowel is severed and the exposed mucous membrane of the retained tissue carbolized. A blunt pointed artery forceps inverts the stumps and the purse string sutures are tied.

The loops are now brought alongside. A chromic catgut suture, No. 0, 20 day, on a proper sized, long straight intestinal needle is now employed at the operator's end of the anastomosis and a continuous Lembert stitch is rapidly introduced, the needle being grasped each time by a forceps in the hand of an assistant. The loops of intestines are pressed closely together by the first assistant, which makes the introduction of the suture easy and rapid. This suture is continued along the bowel surface near the the mesenteric border for about three inches.



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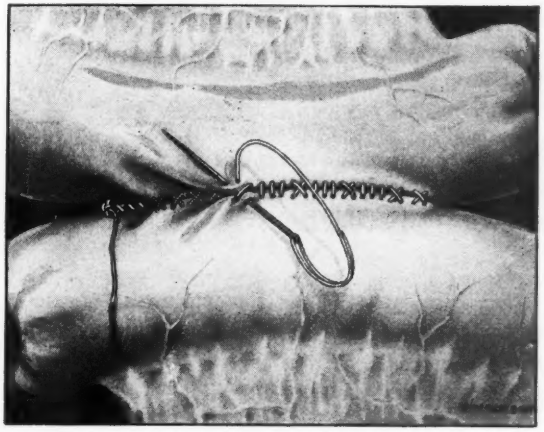

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The loops, well surrounded with fresh moist gauze pads, are now opened close to the suture

line with a sharp knife and enlarged by a blunt pointed straight scissors, until the opening is made in either loop about two inches or more in length. The bowel is gently stroked towards the anastomotic opening and the field well cleared. Hot compresses lessen the bleeding somewhat.

An inner suture of Pagenstecher thread is now started at assistant's end and a continuous back-lock stitch is quickly introduced, passing through all the coats near the cut lines. (Fig. 2.) It is continued around the anastomotic opening, the angles safely secured by a deeper hold of the tissues. When the opposite side of the through and through stitch line is reached the assistant's thumb and index finger with sponges closely approximate the mucous edges, the suture is so placed as to turn the mucous membrane in by a through and through modified Cushing's suture with the loops appearing on the inner surfaces of the bowel (Fig. 3). When the other angle of the opening is reached it is carefully secured with a few supplementary sutures and tied to the end left. This stitch is locked to prevent pursing.

The needle, threaded with the chromic catgut, by which the first line of approximation was made, is now picked up and the Lembert stitch is continued around the rest of the anastomotic opening, enclosing the inner or Pagenstecher suture line (Fig. 4). The loops of intestines being held by sponges in the asistant's and operator's hands from their respective sides. The angles are especially well secured and locked and the suture tied to the long end left at the beginning of the sewing. If any weak or doubtful point remains, the omentum may be stitched here with plain or chromic catgut.

SUMMARY.

1. The present day success of intestinal surgery is due much to the careful observations of conservative clinicians.

2. Progress was made when surgeons had a better understanding of bacteriology, biology and a clearer conception of the vital processes in connection with all lesions within the abdomen.

3. The part played by the peritoneum in connection with infection within the abdominal cavity and the repair of wounds of the intestines is now known and this knowledge has greatly modified surgical technique.

4. The study of phagocytolysis, antibodies and opsonins in the blood has enlarged the surgical horizon. The elimination of all possible bacteria from the alimentary canal previous to the operation and the strict observation of asepsis at the time of operation has greatly increased the possibility of success in intestinal work.

5. The various instruments and appliances formerly used to facilitate the surgeon in his work upon the intestines have about all been discarded for the simple but efficient method of intestinal anastomosis by thread and needle.

6. The general condition of the patient, consistent with the exigencies of the case, should be as near par as possible; all the organs should be functioning properly, the temperature and blood normal, to obtain the maximum results in surgical work upon the intestines.

7. The work should be done carefully, but rapidly, which is oftener the case where the surgeon has, from practice or experimental work upon the lower animals, become skillful in the use of needle and thread.

8. A positive blood supply to the tissues making up the anastomosis is necessary. The end to end method is not so certain, therefore the side to side anastomosis should be chosen when convenient.

9. The evolution of the intestinal suture has brought us to the point where we are certain of good results, when the sutures are properly applied and are of the right material.

10. Non-absorabble suture material should be cast off into the lumen of the intestines after serving its period of usefulness; this is best accomplished when used for the inner line. There is also less destruction of tissue and it is sooner removed.

11. When placed externally it causes un-

necessary adhesions, plastic exudate and fibrous bands. It may interfere with proper bowel function because of its prolonged irritation.

12. Absorbable suture material used for the outer layer is soon taken care of and does not cripple the action of the intestine.

13. The application of the suture in intestinal work has been carefully studied. It must serve the purpose of controlling hemorrhage, proper coaptation of the tissues, security against leakage, must avoid pursing, be quickly introduced and not strangulate the tissue. The back-lock stitch of Pagenstecher thread as applied by the author for the inner layer serves all these purposes.

14. Experimental work has demonstrated that chromic catgut lasts sufficiently long when employed as the outer suture for positive and firm union to occur.

15. A perfect, clean and satisfactory result is obtained by the inner Pagenstecher lock stitch and a chromic catgut for the outer stitch in intestinal anastomosis.

16. The after treatment of cases of suturing the bowel, should be carefully supervised, e. g., by limiting the diet, starvation treatment if necessary, until the union is sufficiently strong before the bowel is called upon to pass the contents onward.

1020 *Donaldson Building.*

The Power of Imagination

A clergyman who had once lost his voice from laryngitis could never thereafter face a congregation without losing his voice again and becoming speechless, unless he had an understudy, so to speak, ready to instantly take his place if he failed; in which case he never failed.

A brakeman injured his back and was lame for six months. When he recovered he insisted that the function of sensation in his lower limbs was lost. When, at one sitting, he was convinced of his mistake, he promptly recovered.

The Boers, before the African war, were considered cowards because their youths avoided manual encounters in every way possible. They had, for generations, been taught that fist fights were degrading. It was learned later that though they might not return a blow they were not afraid to exchange bullets.

Their fear of pugilistic punishment was suggestive, i. e., hysteria. (Tom A. Williams.)

The article quoted is a logical, forceful plea against terrorizing children. Who among us has been so fortunate as to escape such wicked suggestions. Mistaken religious duty has been responsible for many hours of unhappiness if not of torture, to sensitive young minds. The writer can never forget or forgive the terrors with which the dream, often renewed and not exorcised for years, that for some venial sin Satan in person pursued him through dark streets, into vacant houses, over and under the pews in a midnight church, pursued his slumbers and wakened him shivering with horror. The grown-up that would introduce such an image of terror to the facile imagination of an alert, sensitive child, deserves the severest penalty of the unwritten law.

When the physician is able by plain common sense to free young fancies from such follies as suggestive hysteria he does well.

But it will not be well if he fails to remember that sometimes these suggestions would do no good if they fell upon uncongenial soil. An indigestion, a constipation, a derangement of metabolism, too little ventilation, too much school ambition, these and many other things can tune the nerves to such a tension that when touched by even a foolish hand they can respond with vibrations of a fear that will continue to reproduce itself until properly treated.

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Next Meeting Hattiesburg, Miss., November 11-13, 1911.

The Treatment of Eclampsia

The Journal of the A. M. A. in its issue of January 7th, publishes an article of great interest on "The Treatment of Eclampsia," by Edwin B. Cragin, M. D., and Edward T. Hide, M. D., of New York, in which some valuable suggestions of a practical nature merit more than a passing notice.

The article deals with the pathology of the condition, and also shows in eleven fine, microscopic pictures the difference between the effects of ether and chloroform upon the tissues of the liver and kidneys when they are kept for several successive hours under the influence of these anesthetics. The unavoidable conclusion these illustrations enforce is that when a general anesthetic is required to control puerperal convulsions, ether is the one admissible agent, while to saturate the system with chloroform hour after hour under these circumstances would be to vastly diminish the patient's chances for recovery.

The medical treatment is directed to the elimination of the products of metabolism, the combating of the results of toxaemia and the reduction of abnormally high blood pressure. The first is accomplished by the use of the hot air bath, or the wet pack, the drinking of large quantities of water and the irrigation of the colon with saline solutions, and the administration of calomel and saline or other laxatives.

Concerning the reduction of blood pressure they say: "While venesection is the choice of many obstetricians, and was formerly employed by one of us, its use has now been superseded at the Sloane Maternity by veratum viride, nitroglycerine and chloral, and with better results."

"Our method of using these drugs in toxaemia threatening eclampsia is as follows: Chloral (30 grains) is administered per rectum as one initial dose, and then repeated in doses of from 20 to 30 grains from every four hours to every six hours, according to the restlessness of the patient. Nitroglycerine grs.

1-100 to gr. 1-50 from every two to every four hours is given hypodermically.

If under the use of the larger doses of these drugs the tension still remains high we depend on the use of veratrum viride rather than venesection."

They use from 2 to 5 drops of Squibs' fluid extract hypodermically, beginning with the larger dose and administering a second but smaller dose in one or two hours unless the pulse rate has fallen below 100, which will be accompanied by a coincident fall of tension.

The treatment of eclampsia adopted by these eminent gentlemen at the Sloane Maternity Hospital is thus described to call attention to the slow manner in which the ideas and discoveries of country practitioners win their way to acceptance by the leaders of medical thought and literature. Here is Cushing, in his latest edition of his well known textbook on Pharmacology and Therapeutics, saying that veratrum viride might well be excluded from material medica. Sollmann in his latest edition of his textbook on Pharmacology dismisses the "Therapeutics" of veratrum with a single sentence, which compares it unfavorably with aconite and ignores its effect on arterial tension. Yet there is not another drug known to medicine, and the writer says it with full understanding of the meaning of his words, that will do the work that veratrum will do, as simply, as certainly, and as absolutely devoid of danger. Some authorities claim that its action is identical with that of aconite, that only because its emetic effect causes poisonous doses to be rejected by the stomach is it a less fatal drug than aconite. Such statements betray ignorance of the facts. Three drops of Norwood's tincture of veratrum given every twenty minutes will cause nausea and relaxation of striped muscular tissue after four or five doses, so that probably any further doses by the mouth would be rejected. But that this is not the cause of its freedom from fatality is proven by the well attested fact that 20 drops of Norwood's tincture has been given hypodermically every hour for five consecutive days and nights, with recovery of the patient from eclampsia as a result. Is there anything in the nature or action of aconite that parallels this?

In the treatment at the Sloane Maternity Hospital it is very possible that the administration of veratrum earlier and in larger doses would have obviated the necessity for much of the chloral and nitroglycerine.

Another illustration of the light esteem in which many pharmacologists hold all forms of demonstration save those of the laboratory is the cheerful way in which they ignore the clinical conclusions of hundreds of able physicians concerning the usefulness of viburnum prunifolium in threatened abortion. In spite of the faith reposed in it by thousands of physicians all over the world they do not believe in its powers, for it has had no laboratory demonstration. Sollmann, in his latest edition of "Pharmacology," says: "There is no experimental foundation for its use."

Hare simply ignores it altogether.

Wood mentions it doubtfully and Potter is not positive in his statements concerning viburnum prunifolium.

On the other hand clinicians like Butler, Wilcox and Stevens corroborate the reports of the practicing physicians. Strange that results observed in frogs, dogs and guinea pigs should be so much more convincing than those upon man.

The American Society of Tropical Medicine

This number of the JOURNAL is devoted chiefly to the publication of papers read before the American Society of Tropical Medicine, and others germane thereto.

The study of diseases peculiar to, or most frequently seen in, tropical regions is daily becoming more important to southern physicians.

Their territory adjoins the Gulf of Mexico which is the great highway of communication between the cities situated in Mexico and

South America and those of our own country, and the ever increasing traffic between the two regions insures not only the exchange of compliments and commodities, but also the mutual transmission of disease-bearing persons and substances that will inevitably result in introducing numerous pathological conditions hitherto unknown to this country.

Indeed such has already been the case to some extent, witness uncinariasis, filaria, bilharzia, strongyloides intestinalis, etc. Undoubtedly the increased communication resulting from the completion of the Panama Canal will greatly multiply the instances of importation of tropical diseases. It falls to the lot of southern physicians to act as outpost sentinels, guarding the land from being unconsciously invaded by devastating diseases. Such general misfortunes to agriculture as the Mexican boll weevil or the San Jose fruit scale must not be paralleled in medicine by unresisted invasions of tropical diseases which might, unrecognized, fasten themselves upon large communities of human beings. In order to be fully armed and equipped for this important duty our southern students of and graduates in medicine must have ample educational facilities at their command.

Particularly they must be drilled in all the technical skill of the laboratories of pathology, physiology and pharmacology in order that they may be qualified to recognize and destroy the foe at the point of first invasion. True, for many years the Schools of Medicine at Tulane and Mobile have provided special instruction in Tropical Medicine.

In Mobile such well known physicians as Dr. J. H. White and Dr. J. H. Guiteras, both eminent members of the Marine Hospital Service, have, in the past, had charge of this subject in the School of Medicine of the University of Alabama there situated, and at present Dr. Von Esdorf, in the same service, gives able instruction in this branch of medical study; while men of equal prominence and experience have directed the same studies at Tulane.

But such supplies are inadequate to meet the growing demand. Every school of medicine in a southern state should have a chair of Tropical Medicine, in correlation with the work of a post graduate school of tropical medicine at New Orleans conducted by the dean of the Tulane School of Medicine. The work thus unified and completed would warrant the establishment of a degree of Doctor of Tropical Medicine, T. M. D., to be eligible only to graduates in medicine, who, in addition to the equipment demanded for the earning of the degree of M. D., should also possess the ability to read, write and speak with practical fluency, the languages chiefly used among the tropical peoples living nearest us, namely, Spanish and French. New Orleans is peculiarly fitted for the location of such a post graduate school of tropical medicine, for in addition to the advantages common to other seaports, it has certain sections of the town wherein, if a student established his temporary residence, he would hear and speak only Spanish or French, according to his location.

The JOURNAL would rejoice to see such a post graduate school established at New Orleans, wherein the student who contemplated trying out his fortune in any of the republics or dependencies south of us, could be equipped with the knowledge he would need to use and the language with which to express it, and could prove his possession of the same by displaying some such abbreviations after his name as A. B. (Ala.), M. D. (Ala.), T. M. D. (Tulane).

In this connection we call attention to the splendid article on malaria, etc., by Dr. John M. Swan, Secretary of the American Association of Tropical Medicine.

It is a work of great labor and careful observation and deserves the study and consideration of every student who is interested in the chief of all medical problems, the control and abolition of malaria. Dr. Swan's position as secretary of the association indicates the fact that from the very beginning he has been the working element, the organizing influence, the

mainspring of the association. Many other members have labored assiduously for the establishment and growth of the organization, but, as is often the case in most such bodies, the secretary has borne its destinies and fostered its interests until from its first small membership—small in numbers only—it has now come to count many of the most prominent medical workers in America among its enthusiastic supporters. The JOURNAL is proud to be made the medium of expression through which Dr. Swan and his eminent coworkers present their views and conclusions to the great medical public.

The Southern Surgical and Gynecological Association

The twenty-third annual session of the above named association was held at Nashville, Tenn., December 13 to 15, 1910, the President, Dr. W. O. Roberts, of Louisville, Ky., wielding the official gavel.

The following named gentlemen were elected to the respective official positions in the Association here specified for 1910-1911:

President, Dr. Rudolph Matas, New Orleans, La.

Vice-Presidents, Dr. Guy Leroy Hunter, Baltimore, Md., and Dr. T. Garland Sherrill, Louisville, Ky.

Secretary, Dr. William D. Haggard, Nashville, Tenn.

Treasurer, Dr. William S. Goldsmith, Atlanta, Ga.

The next annual meeting will be at Washington, D. C., December, 1911.

The meeting was marked by harmony and enthusiastic interest. The papers, many of which will be published in this Journal, were of a high order, and represent the best thought of modern physicians, and not only in the South, for its membership includes eminent physicians from every section of the country. The Association limits to fifty the number of papers to be read at any one session, and the result is a thorough consideration and discussion of every subject on the programme.

It was the intention of this Journal to devote the present number to the publication of a number of these papers, but a press of matter from the American Society of Tropical Medicine, matter whose immediate publication is required for their published transactions, crowded out the papers of the Surgical and Gynecological Association and compelled the postponement of their consideration until the issue of next month.

Every month we present our readers with a mass of modern literature which cannot be met with elsewhere, and which forms a mine of rich and practical knowledge at the service of Southern physicians. The March number will contain contributions by men well known all over the country, as does the present issue, a list of whose authors reads like a roster of the leaders of medical thought whose fame is the property of the whole English speaking peoples. The organization of the Southern Surgical and Gynecological Association was due to the ability and energy of an Alabamian, but its influence extended and strengthened until today no single part of our common country can claim it as its own.

In fact, the genius of medicine yields no homage to geographical boundaries. Like Materia Medica every created element that can serve its purpose it claims as its own, and all true doctors feel a sense of fraternity that scoffs at state lines. The Southern Surgical and Gynecological Association belongs not only to the South, but to all the States in the Union and from whatsoever part of that Union a member chances to hail, he is a full fledged brother to every other.

Salvarsan

A new name has been given to Ehrlich's famous "606." It is *"salvarsan,"* and the term has been generally welcomed as a more suitable addition to technology than the three Arabic numerals previously used, or the chemical syllables that sometimes replaced them, arseno-benzol.

We learn that though the prompt and satis-

factory results first noted still continue in the majority of cases, yet a difference in degrees of usefulness is being determined by clinical experience. The following conclusions seem warranted from a careful survey of recent periodical literature. First, thus far no case of death caused by the proper employment of salvarsan has been published, though Montgomery (California State Medical Journal, Jan., 1911) says that it is "freely *rumored* that there are now fourteen deaths from its use," one man of 35 and in good general condition dying in three hours and a half after receiving the injection, with symptoms of acute arsenical poisoning. Further conditions are not mentioned.

Professor Rehl, of Vienna, noting the results of 40,000 administrations says that not one death could be ascribed to it. He calls attention to the fact, *per contra*, that during the last five years 90 fatalities have resulted from mercury injections. This does not take into account the mercurial dermatoses and obstinate necroses observed by French clinicians.

It is evident, therefore, that though the 14 "rumored" fatalities should be confirmed, yet in this respect salvarsan is a great advance over any remedy for syphilitic conditions hitherto at our command. Second, the probability is that its effects will prove to be as permanent as those of any other known remedy for syphilis. Several prominent German physicians make the point that there is so far no evidence that the curative effect of salvarsan is permanent. Indeed in 8 per cent of recent cases of the disease thus treated relapses have already occurred. The same objections, however, apply to every other antiluetic treatment employed, while the comparative safety of salvarsan is a deciding point in its favor even though further observation confirms the adverse rumors mentioned by Dr. Montgomery. Third, there are indications that the injection of salvarsan has some objectionable effect upon the optic and auditory nerves. It seems almost to invite syphilitic attack upon these important structures when used in very recent cases of the disease. Therefore during the influence of salvarsan care should be observed to protect the eyes and ears from everything that might reduce their natural powers of resistance to syphilitic attack.

Fourth, the beneficial effects of salvarsan are most evident in syphilitic affections of the *skin, mucous membranes* and *glandular structures*, and least in luetic affections of nerve tissue.

Fifth, the operator must expect more constitutional reaction from the injection of full doses of salvarsan than the early published observations indicated. Matzenauer (Journal A. M. A., Jan. 7, 1910, p. 54) specifies "fever up to 104° F., general malaise, sweating, vomiting and swelling of the syphilitic lesions." Necrosis on the 14th day at the point of injection has been mentioned, but not verified. However, it will be remembered that similar results are known to have followed sometimes after the subcutaneous injection of mercury over the buttocks.

Ehrlich cautions against the use of this remedy in certain conditions, namely: Extensive degenerations of the central nervous system; in paresis and tabes; in heart disease, and especially in angina pectoris; and in aneurism. It would also be well to beware of a condition of hypersensitiveness to salvarsan caused by a previous injection, as about eight or nine days after a treatment a certain per cent of the patients show an exanthem like scarlatina or rubeola, with sore throat, malaise and a temperature of 104° F. This condition may last for several days (Weschelman), and it would evidently be unwise to repeat the dose at such a time.

Sixth, either the Wasserman reaction has not proven a reliable indicator, or the salvarsan is not uniform in its effects, for in some cases, after promptly disappearing within two or three days, the reaction returned after a negative period of "from six weeks to three months, while in other cases of syphilis

repeated injections of salvarsan utterly failed to inhibit the Wassermann reaction."

It has been learned that the nursing infant of a syphilitic mother, itself suffering with congenital syphilis, is very favorably affected "apparently by the prompt development of antibodies" which "pass into the milk"; and that "serum of a patient freshly cured or treated by '606' has a definite action of syphilis in both adults and children." (Die Experimentelle Chemio-therapie, etc., etc., Von Paul Ehrlich und S. Hata.)

Further experiments indicate that salvarsan is as efficient in destroying other spirillae as in the spirocheta of syphilis. It has been successfully used for the radical cure of framboesia and recurrent fever.

In conclusion one may say that a broad survey of the literature leads one to believe that salvarsan, though not infallible, is an extremely valuable addition to the therapeutics of syphilis, and perhaps of other diseases caused by spirillae; that it is more useful in old than in recent cases of syphilis; and that the more malignant the disease the more striking the success likely to be achieved.

The average dosage used for injection in Germany is 1-10 of a gram to one kilogram, which would be approximately one grain for every twenty pounds of body weight. In practice, however, a 200-pound patient receives Gm. 0.5, or about 7 1-2 grains. Larger doses may be used, even to 10 grains if needed. A neutral saline solution is the vehicle preferred. The intravenous injection, which is being carefully tested, promises even better results. One injection is expected to cure the case in most instances, whether intravenous or subcutaneous.

At the first appearance of the favorable reports on "606" it seemed to be possible to so nearly eradicate syphilis from the list of barriers between timid men and illicit indulgence that some apprehension was expressed, chiefly in a humorous way, that the morals of society might suffer in consequence. But the flaming sword before the gates has not been sheathed, only hidden a little behind a scientific formula. There still remain the following realities to dread. The injection of salvarsan is apt to be very painful, the pain continuing perhaps for 36 hours and demanding narcotic relief, followed by a tender tumor at the point of injection. Instances are reported where the flesh at such a point has necrosed, sloughed away, a result both slow, weakening and dangerous. Instances are rumored of deaths resulting from the injection. Instances are recorded where blindness or deafness either have resulted or threatened to result from the injection.

Instances are recorded wherein repeated injections of salvarsan failed to effect any curative results upon the syphilitic patient.

Finally, no one knows how long the cases cured thus far will remain cured.

Other cases have been cured by mercury and remained apparently well for more months than salvarsan has been known to the profession, and then to break out again with undeniable syphilitic phenomena. Only the relapse of many months can authorize a final conclusion.

A Covert Insult

Probably there is not a regularly licensed and registered physician anywhere who is not frequently made the helpless subject of an insult so slyly concealed that he does not recognize its true inwardness though some do experience an unformed feeling of resentment when the insult strikes them. What would you say to an utter stranger who should come uninvited into your office and say: "My dear friend, I know you are considered a doctor by people who are not posted, but you and I know better."

"Now here is this and that and the other sort of cases that you can't cure and don't know how to treat. If you will just give them the medicine I will furnish you, never mind what it is made of, it will cure them and you can pocket the fees, only paying me my price for the drugs."

Would you not rejoice if your shoes had extra heavy soles and sharp toes? Yet here come letters every week expressing similar thoughts though not in the same words—"If you will treat your cases of drug habits with our hyoso-morpho-codeino-pilocarpo compound you will cure them easily, promptly and safely. Medicine sent C. O. D. in sealed packages." Which means, doctor, that some firm of name-list dealers has your name on its "sucker list," and you are classed as one of a herd of incompetents who know so little of therapeutics that they are willing to dose their patients with powerful, poisonous compounds of whose constituents they know nothing.

How do you like the idea of being on such a list of names, sold at so much a thousand suckers? Yet every time you answer a fake advertisement you help to fill out a new sucker list. Nice, isn't it?

A Merited Honor

To a great many physicians in the South the name of Leitz is well and favorably known because of the excellent clinical microscopes which are manufactured by the firm that bears the name of Ernest Leitz, whose establishment is located at 30 East 18th Street, New York. Though most individual physicians may have no personal acquaintance with Mr. Leitz, yet being predisposed in his favor by a knowledge of the fine workmanship shown in the instruments supplied by his firm, they will be pleased to learn of a public honor recently bestowed upon him. The University of Marburg in Germany has conferred upon Mr. Ernest Leitz "the honorable degree of Doctor of Philosophy (Ph. D.) on account of his meritorious services rendered to science, by having constructed for over 50 years instruments of the greatest scientific value."

It is good to see persistent, honest workmanship rewarded with profit and honor, whether in our own country or in any other part of the world.

Though science may outline geography, geography can set no bounds to science when it sees fit to honor its votaries.

So here is to Ernest Leitz! May his good fortune always appear as though viewed through the proper end of his own microscopes, and bad luck, if at all, like a glance through its reversed lenses.

An Unworthy Feeling

In the November number of the Journal-Record of Medicine, speaking of salvarsan, the editor says:

> Much bitterness of feeling exists in Germany over this remedy—attributable, perhaps, to jealousy, or to injured pride, because none of it had been given to many prominent men to test. In France, too, there has been considerable unfavorable criticism; this has been led by Hollapeau, who has a method of his own, by which he claims to abort *beginning* syphilis in 30 days. Unfavorable reports have also originated in Aix-la-Chapelle, the "Hot Springs" of the continent, where there will result a great financial loss from quick cures of syphilis by "606." There is also some feeling against Ehrlich, because he is a Jew, and because he has intrusted much of the experimental work to Jews."

It is humiliating to realize that learned and otherwise sensible doctors of medicine will allow their judgment concerning visible conditions to be affected and even distorted by such extraneous considerations. Ehrlich may be a Jew, but salvarsan is neither Jew nor Christian, and salvarsan is the subject of discussion.

PERSONALS

NOTE—The Journal solicits items of personal news from members of the medical profession all over the South.

Dr. Gilman J. Winthrop announces that hereafter his practice will be limited to surgery, while Dr. Herbert P. Cole announces that hereafter his practice will be limited to surgery and gynecology. Both gentlemen have

offices in Mobile. Readers of the Gulf States Journal of Medcine and Surgery and of other medical periodicals will recognize under these names the authors of several brilliant and important papers, especially those recording the results of some very thorough and original investigations in pellagra. The Journal wishes them the success deserved by their ability and courage.

When a Southern doctor departs so far from the usual habits of Southern doctors as to record the clinical observations of years and finally embalms his conclusions in useful books of general interest to his professional brethren, his name deserves a place in the light of periodical publicity. Dr. J. H. McCurry, of Grubbs, Ark., is such a Southern doctor. He has written and published two books which it will pay any doctor, Southern or Northern,to "read, mark and inwardly digest." Their titles are: "Malaria and Its Manifestations" and "Practical Pointers for Progressive Physicians." This "personal" is spontaneous, and not an advertisement nor yet a reading notice, but a mere expression of good will.

Dr. John B. Murphy, of Chicago, president of the American Medical Association, gave a special clinic at the New York Post-Graduate Medical School, January 6, on Bone and Joint Surgery.

Dr. G. E. Gavin, of Mobile, has recently returned from Europe where he has been doing surgical work in the hospitals of Vienna and London.

Dr. Joseph Schwarz, who has spent the past six months in London and Vienna, doing special work in pediatrics, has returned to Mobile.

BOOK REVIEWS.

DIAGNOSIS OF SYPHILIS.

By George E. Malsbary, M.D., Cincinnati. Price, $5.00 net. Harvey Publishing Company, Cincinnati, 1911.

One of the handsomest medical books that has recently lain on the reviewer's table bears the above title.

Physically it is some taller and wider than the average text-book, is bound in half-morocco, printed on the best grade of lusterless paper in clear, black type, with wide margins, and contains over 400 pages.

This work is, so says the author, "based upon notes collected during a number of years, and an exhaustive study of the literature."

First, attention is paid to laboratory diagnosis, "special stress being placed upon the methods of recognition of the spirochaete pallida, and the technic and relative value of the Wasserman and other tests."

Second, hereditary syphilis is studied; third, the acquired form in its various stages; fourth, the syphilitic affections of the various organs; fifth, an appendix of recent bibliography.

From this brief resume one can readily see that the whole field passes under review. and only the true, condensed, systematic, tabular forms in which the many points are presented obviates the necessity for several volumes instead of one to convey the immense amount of instruction embraced in the work. The bibliography alone, occupying over one hundred double-column pages, will render the book a standard of reference to which students of syphilitic affections will resort for authorities for many years. No doctor of large practice, above all, no specialist in venereal diseases can dispense with this work.

THE AMERICAN JOURNAL OF SURGERY.

One of the most valuable professional periodicals published in this country is the journal with the above title.

It is principally devoted to the interests of surgery, and affords its readers up-to-date information concerning everything connected with surgery. In addition to that it notes and comments upon many other things of general interest to the medical profession.

The enterprise of its managing editor, J. MacDonald, Jr., M.D., is illustrated by the number for January, 1911. It is characterized by the number of original articles by Southern doctors, and bears the subtitle: *"Special Southern Number."*

Among the authors represented therein are the following well known gentlemen, each of whom writes upon the subject concerning which he is considered an authority: Howard A. Kelly, M.D., Baltimore; J. Shelton Horsley, M.D., Richmond; Willis F. Westmoreland, M.D., Atlanta; Stuart McGuire, M.D., Richmond; Southgate Leigh, M.D., Norfolk; Drs. V. and V. W. Pleth, Seguin, Tex.; Geo. R. White, M.D., Richmond; C. S. Venable, M.D., San Antonio; Louis Frank, M.D., Louisville; Edgar D. Capps, M.D., Ft. Worth, Tex.; and H. Berlin, M.D., Chattanooga.

Such an array is simply irresistible to any surgeon who desires to keep abreast of the times. If you are not a subscriber, order the January number, anyhow.

AN OLD FRIEND.

An old friend comes to the reviewer's table as bright and fresh as when sixty years ago it was first welcomed by the busy doctor everywhere.

It is The Physician's Visiting List, published by P. Blakiston's Son & Co., 1012 Walnut St., Philadelphia.

The Visiting List is precisely what its name indicates, and considerably more. It is a memorandum of visits to be made and that have been made, a simple mark indicating the call or the engagement and its character, as obstetrical, consultation, etc.

Though a doctor could rely entirely upon its condensed records for keeping posted as to the condition of his business, it is not so intended. Every doctor should keep his accounts in a single-entry ledger of good size, writing the patient's name at the head of the page, a designation of service rendered, and the charge on the left half of the page and the credits on the right half, so that there would be no confusion of mixing debits and credits. With such a book of permanent records, and the Visiting List for a daily memorandum, once a week would be often enough for posting, and the system is perfect.

The "List" is an elegant pocket affair, gilt edged, of an exquisite quality of paper, bound in the highest grade of morocco, with tuck, flap and pencil complete. After sixty years of usefulness it is today more popular than ever. There are tables of comparative weights and measures, of Centigrade and Fahrenheit temperatures, and a list of doses of over 1,000 drugs. There are spaces for 25 patients daily every day in the year, and the pages can be modified to suit unusual demands.

No physician can realize the convenience and economy afforded by the Visiting List until he has tried it.

ANATOMY—DESCRIPTIVE AND APPLIED.

By Henry Gray, F.R.S. Eighteenth Edition. Revised and Re-Edited, with Additions. Illustrated with 1,208 Engravings. Lea & Febiger, Publishers, Philadelphia and New York.

Gray's Anatomy is the greatest text-book and the best-known work in all medical literature in the English language.

This new edition is claimed to be the most thoroughly revised of any. Every line has been carefully considered, and much has been rewritten. The illustrations have also received all needed revision, and many new ones have been added, yet withal the number of pages has been considerably reduced, chiefly through condensation and omission of duplications. Names of parts are given first in English, followed by their scientific nomenclature in brackets, and different type, as: "Articular disks (*Menisci articulares*)," Internal Condyle (*epitrochlea, or epicondylus medialis*)," thus rendering the book universal in the prime essential of terminology.

Wherever necessary the organs or tissues are differentiated by bright colors.

Gray's Anatomy has so long been almost the universal favorite with students, physicians and medical colleges that it might truly be called the cornerstone of scientific medicine. This edition surpasses its predecessors in many respects. It has few rivals in thoroughness, clearness, and scientific accuracy regarding the all-important subject it teaches so well.

THE PRACTITIONER'S VISITING LIST.

Lea & Febiger, Philadelphia and New York.

This pocket account book though so arranged as to be of great practical value is yet different in some important respects from the other visiting lists with which it is in competition. One point which will win favor in the sight of many is the simplicity of its arrangement. It is alike all the way through. Each page is so ruled as to accommodate memoranda of services to five or six patients on each day in the week.

When one starts in to keep accounts therein he can assign one subdivision of a page to his patient, or half the page, or the whole page, and every line will take care of seven visits, one for each day; or two or more visits may be indicated in the space under one date.

Consequently it is a very elastic form of memorandum book capable of serving as scratch book, day book, cash book or ledger. It is elegantly gotten up, the paper is first-class, the binding tasteful and durable, and the ruling artistic in its neatness and precision. The usual amount of useful information is printed in the first part of the little book.

With such facilities for keeping accounts straight no doctor has any excuse now for presenting a paid account the second time or, what is equally inexcusable, failing to present a bill at all. The first is aggravating to the patient, the second is insulting. Avoid both horns of the dilemma by obtaining a good pocket visiting list, and using it.

PATHOGENIC MICRO-ORGANISMS, INCLUDING BACTERIA AND PROTOZOA.

By William Hallock Park, M.D., and Anna W. Williams, M.D. Fourth Edition, Enlarged and Thoroughly Revised. With 196 Engravings and 8 full-page Plates. Published by Lea & Febiger, New York and Philadelphia, 1910.

The place filled by this work in the intelligent and practical study of pathogenic organisms of every description, thus far recognized and segregated, is of the utmost importance to all students and practitioners who desire to keep posted in the most advanced work of diagnosis and antisepsis. In this fifth edition are some very useful tables, those found in the chapters on the colon-typhoid group of bacilli, and on malaria, being especially clear and of practical use.

All the latest accepted views on such subjects as bovine tuberculosis, anti-meningococcic serum, bacterial vaccines, anterior poliomyelitis, trachoma, etc., are clearly and forcefully presented.

Both students and physicians will find this work indispensable for the study and understanding of the latest advances in scientific diagnosis, as well as in certain newly introduced methods of treatment devised since the preceding edition. Indeed it is not improbable that the first to purchase it will be those who have benefited by the preceding editions and therefore know the high grade of the work it formulates or describes.

A TREATISE ON ORTHOPEDIC SURGERY.

By Royal Whitman, M.D. Fourth Edition, Revised and Enlarged. Illustrated with Six Hundred and One Engravings. Published by Lea & Febiger, Philadelphia and New York, 1910.

All surgery is more or less mechanical in its operations, but orthopedic surgery supremely so. The art of preventing or correcting the constructive errors of nature, or the distortions caused by disease or accident, calls for the combined talents of the inventor, the mechanician, and the anatomist, and those of the highest type. That such an artist, for no other word describes the required character, is the author of this book is proven by an examination of the work.

The construction is such that the most important subjects receive the extra attention they deserve, and the text and engravings so vividly explain and illustrate the various conditions and their management that they are equivalent to so many clinical demonstrations, to clinics so patient and so continued that they may be studied and mastered at leisure. It is difficult to find places where more photographs, shadowgraphs or diagrams could be added with any increase of lucidity.

The book, though adapted to the necessities of the medical student, is none the less so to the doctor engaged in active practice.

Especially valuable is it to the general practitioner in enabling him to make the early diagnosis of many conditions that is essential to successful treatment.

No doctor's library is complete without the fourth edition of Whitman's Orthopedic Surgery.

CATALOGUE OF TRAUX, GREENE & CO., PHYSICIANS' AND HOSPITAL SUPPLIES. (Twelfth Edition.)

What physician, what surgeon, has not at times been temporarily at a loss to decide exactly what instrument or apparatus to order, either to meet some special necessity, or for a permanent convenience in his office? Then he rummages in piles of dusty, antiquated pamphlets in search of some dimly remembered advertisement whose engravings made an impression when he saw them, but which now are only a shadow of a memory.

All such will recognize the great convenience a regular bound book of standard size and good appearance and containing illustrations, descriptions, and net cost prices of every possibly needed article, would be, standing with his other books upon a shelf in his working library.

Such a work is the illustrated catalogue of Traux, Greene & Co., of 42-44-46 Wabash Avenue, Chicago, Ill., U. S. A.

It is a well bound, full-sized book of 640 pages, the first one hundred of which are devoted to drugs, chemicals, ready-made tablets and pills, proprietary remedies, etc., followed by a list of a complete line of druggists' supplies, and toilet articles. From the 120th page to the end of the book every page is covered with illustrations showing every form of office apparatus, hospital furniture, surgical, orthopedic, electrical and other instruments, the whole affording a complete view of almost everything of any description that the necessities or the fancy of a physician, surgeon or specialist could require. The engravings are clear and artistic, and the press work above criticism.

THE PHYSICIANS' POCKET ACCOUNT BOOK.

By J. J. Taylor, M.D. 212 pages, leather. Price, $1.00, postpaid. J. J. Taylor, Publisher, 4105 Walnut St., Philadelphia, Pa.

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THERAPEUTICS.

BURNS.

At this time of the year the physician is liable at any time to receive a hurry call to a patient accidentally burned. Only one who has suffered the agony of a severe burn can realize the desirability of instantaneous relief. In a majority of instances this can be accomplished, but the plan of treatment that should be adopted depends so much upon the locality, extent and depth of the burn that each case is a law unto itself. One thing, however, may be considered applicable to all but very deep and extensive burns, and that is, keep them free from all oily applications, including the old mixture of sweet oil and lime water known as carron oil. It gives neither relief nor protection and is in the way of better forms of treatment and its removal with soap and water is unpleasant to doctor and patient. To burns of moderate size and depth the

quickest relief is afforded by a dressing of flour. Though not surgically aseptic it is practically so, and it relieves the pain as though by magic. An infant daughter of the writer was once tied in an old fashioned baby high-chair and placed before an open fireplace that blazed with hickory wood whose glowing embers heated the smoothing irons for the negro women with whom the nurse had prepared to gossip. A crash and a shriek behind them called their attention. The chair and child had tipped over into the fire with the little one's face in the red hot coals. Some of them had to be removed when, in a few minutes the writer reached the room. As the eyes had fortunately escaped injury it was possible to cover every raw, red burn with flour, to a depth of half an inch. Instantly the babe ceased to scream and did not at any time thereafter apparently suffer pain. Only the loose particles of flour were removed at each dressing, night and morning, and the process of healing went on hidden by the renewed dressings of flour. Ultimately the burns healed, and only two faint white lines on the forehead remain to remind one of the accident over twenty years ago.

A better dressing would have been a saturated solution of picric acid on lint. The dressing should not be changed, unless there is suppuration, but should be kept moist by frequent wetting with the solution.

Every druggist should keep already prepared a liberal quantity of saturated solution of picric acid. Physicians would do well to have a bottle of the solution in their offices, so that upon receiving an urgent call to a burn the relief would be immediate; for it is immediate.

Most foundries keep the solution in half gallon quantities. Picric acid is not a poison, though it is so irritating to mucous membranes that only 10 grains a day can be taken without discomfort. Externally it is antiseptic, analgesic and astringent. Water dissolves it to the extent of only about one per cent. A good formula is picric acid 60 grains, alcohol 3 ounces. Mix, dissolve and add of water 13 ounces, making in all one pint. This amount, kept ready in the office, would be enough for a first dressing for any burn that did not cover more than half the surface of the body. If, on account of suppuration, it should be necessary to change the dressings the old ones should be "soaked" with the warm picric solution until they can be removed without having to break up adhesions. Then, after thoroughly cleansing the wound, a fresh picric dressing is applied. There is no danger in using it over burns, however extensive. There is a record of one patient having fallen into a vat of boiling beer, and afterwards kept in a bath tub full of tepid picric acid solution until the new cuticle began to appear. The writer cannot locate the record just now, but distinctly remembers reading it.

When it is desired to protect the injured cuticle with an artificial epidermis, Rice's dressing is to be preferred. This also should be kept ready for use in well sealed jars. It is made as follows: Seven and a half ounces of white gelatin are soaked in a pint of pure water until softened. Then the mixture is placed in a water bath and heated and stirred until dissolved. Then add one ounce of glycerin and continue a gentle heat, stirring occasionally. When, between stirrings, a glassy skin forms over the mass, add one dram of carbolic acid, mix it well, and pour into well stopped jars or bottles. To use it, set the container in a vessel of warm water and gently heat until the mixture becomes fluid, when it should be painted smoothly over the burn with a soft, broad, flat brush. It forms an elastic, protective covering seldom needing removal. A fomentation of warm water on a folded towel will remove it when desired. When there is much shock and depression, the pulse weak and rapid, skin cool and damp, active stimulation is required. Strychnine gr. 1-20 and digitalis tincture 15 drops may be given, supplemented by 20 drops of camphorated oil if necessary, all being given hypodermically. If the pain continues, or there is

much excitement or apprehension, a therapeutic dose of morphine and atropine will be necessary.

In desperate, extensive cases the patient may be immersed in a bathtub of warm water until the burned skin comes off easily. The picric acid solution can be added to the bath freely. It is very necessary to keep the kidneys active, as an extensive burn causes a toxemia that must be eliminated in the urine. An intravenous injection of a pint decinormal saline solution with one dram of standard adrenalin solution is efficient. Also the standard diuretics, such as acet-theocin sodium, diuretin, citrate of soda, and sweet spirits of niter, are useful.

ANTISEPTICS.

Salicylic acid is derived from two sources. One is an aromatic, procumbent plant, Gaultheria, from whose leaves an essential oil is extracted consisting almost entirely of pure salicylic acid. The oil of Betol, or Sweet Birch, is almost identical, in this respect, with that of gaultheria. The other source of salicylic acid is the action of caustic soda on carbon dioxide and phenol.

Many practitioners consider the drug derived from gaultheria superior in therapeutic value to the synthetic product.

Salicylic acid is a fine, white, crystalline powder, very light in weight, having a sweetish, acrid taste. It is permanent in the air, dissolves with difficulty in cold water, one to three hundred or more, but readily in boiling water or alcohol. Dose, 2 to 60 grains (0.12-4.0 Gm.)

Its compounds are more frequently used in medicine than the acid itself, many of them possessing very valuable properties.

The following are official: Lithii salicylas, or salicylate of lithium, sodii salicylas or salicylate of soda, ammonii salicylas, salicylate of ammonia, all of which are soluble in water and alcohol.

The dose of each is from 2 to 60 grains (0.12-4.0 Gm.)

Externally applied salicylic acid is, as previously stated, an antiseptic and germicide.

It is very iritating to mucous membranes. It also deodorizes and checks abnormal perspiration and increases the uric acid in the urine.

Taken internally it retards digestion, prevents fermentation, and increases secretion of bile. Full therapeutic doses may cause perspiration, tinnitus and vertigo. It reduces excessive temperature.

It is eliminated principally by the skin and kidneys, appearing in the urine less than ten minutes after ingestion. Traces of the drug remain in the system from three days to two weeks after its withdrawal, even though but few and moderate doses were taken. Untoward symptoms sometimes appear, such as urticaria, oedema, muscular weakness, vertigo, etc.

Abortion is said to have followed its administration, and its continued use may cause aneamia. Death from poisonous doses is very rare and occurs by failure of respiration. Diffusible stimulants, morphine and atropine, strychnine and brandy are the proper remedies.

Salicylic acid is used in petrolatum, 20 to 60 grains (1.29-4.0) to the ounce (30.0 Gm.) as an ointment in erysipelas, eczema of an indurated character, impetigo contagiosa, psoriasis, and some forms of sycosis. A weak ointment carefully applied in the ear destroys asperigillus of the outer canal. Internally the salicylates in doses of 20 grains (1.3 Gm.) every two, three or four hours are the most useful agents for the treatment of acute articular rheumatism.

It is not efficient in the hyperpyrexia that sometimes marks the disease, nor is it useful in chronic rheumatism, rheumatoid arthritis, or gonorrhoeal rheumatism. In tonsilitis of an acute character it is as useful as guaiacum. The salicylate of strontium in doses of five grains (0.33 Gm.) taken immediately after meals in powder form is not unpleasant to the

taste and prevents gastric and intestinal fermentation. It is claimed to be less irritating than the other salts.

Salicylic acid and its official compounds, because of their irritating nature, should be given in solution well diluted, and, if possible, while there is food in the stomach. It should not be administered to patients who are greatly debilitated or who have weak hearts.

Bromide of sodium or potassium, 30 grains (2.0 Gm.) if given at the same time prevents the annoying tinnitus. The form in which the drug is most frequently employed is the sodium salicylate. It is sometimes given in powder, or capsule, but is more efficient and less irritating in solution. Phenolis salicylas, salicylate of phenol is known as salol.

It is a white, odorless, almost tasteless crystalline powder, permanent in the air, almost insoluble in water but soluble in 15 parts of alcohol. Salol is a combination of carbolic and salicylic acids, but is a more powerful antiseptic than either, and, unlike them, is not irritating to the mucous membranes. It is believed to pass through the stomach unchanged but to be resolved by the alkaline juices of the small intestine into its original substances.

It is rapidly absorbed and eliminated, its products appearing in the urine thirty to sixty minutes after taking.

It is a valuable intestinal and urinary antiseptic. It relieves the pain and fever of acute articular rheumatism but is a less safe remedy than salicylate of sodium, as large doses may cause phenol poisoning. Dose, 3 to 15 grains (0.19-1.-0) in powder or capsule every four hours. The latter amount may cause smoky urine, in which event its administration should be suspended.

Several allied compounds claim attention, and new ones are constantly being exploited by manufacturers. Among them the following will be found useful: Aspirin and Novaspirin, dose 5 to 15 grains (0.3-1.0 Gm.)

These drugs are analgesic, antipyretic and antiseptic. They are often used for the same purposes as salicylic acid but are more efficient and less irritating for internal administration. Novaspirin causes less perspiration than aspirin. Salipyrene, dose 15 to 30 grains (1.0-2.0 Gm.). It is antipyretic, analgesic and sudorific. Especially useful in influenza.

Salophen, dose 15 to 30 grains (1.0-2.0 Gm.). Resembles salol in its action, but with no danger of phenol poisoning as is the case with salol.

SALICINUM. SALICIN.

Salicin is a white, shiny, crystalline powder with an extremely bitter taste. It is readily soluble in water, less so in alcohol.

Its effects are like those of salicylic acid, but not so powerful. It is sometimes used in place of that drug and its compounds when for any reason they cannot be used. It is much less irritating to the stomach than they. It is a bitter tonic, and has been successfully substituted for quinin as an antiperiodic. Dose, 15 grains (1.0 Gm.).

OLEUM GAULTHERIA. OIL OF WINTERGREEN.

Oil of wintergreen is distilled from the leaves of gaultheria procumbens, a small evergreen plant of North America. The oil is at first colorless but may assume a reddish hue. It consists of over 90 per cent of salicylic acid, and is used for the same purposes. There is also an oil of gaultheria of synthetic origin. The tree oil has a strong, aromatic, pleasant odor, and will rapidly evaporate unless kept in well stopped bottles. Dose, 2 to 10 drops (0.12-0.77 cc), taken in capsules. Externally it forms an important ingredient in liniments for various forms of rheumatism. The following is a convenient formula: R. Olei Gaultheriae—

Olei Terebinthinae aa fluidounces I (30.0 cc).

Extracti Belladonnae Fluidi, fluidrams II (8.0 cc).

Tincturae Aconiti (10 per cent) fluidrams II (8.0 cc).

Aquae Ammoniae q. s. ad. fluidounces IV. (124.0 cc).

Misce. Sig. Liniment. Poison. (External use only).

It should be well and patiently rubbed into

the skin over the painful area, using only the naked hand.

DELIRIUM TREMENS.

In the New York Medical Journal for May 28, 1910, is an article by Frederick S. Dennis, M. D., F. R. C. S., of New York City, which deals in an interesting manner with delirium tremens, especially as affected by trauma.

He says there is no way to foretell the attack of this disorder following trauma except to carefully note conditions as they arise. Some of the preliminary symptoms are restlessness, muttering, incoherent or excited talking, insomnia, delusions, a tremulous and coated tongue, trembling fingers, etc. He believes that when these symptoms, or some of them, supervene after trauma in the case of one habitually using alcohol, or who relies upon narcotic drugs for comfort, we should at once aggressively institute prophylactic measures. It will not do to wait until hallucinations and other complete phenomena appear, for then it is generally too late to avert a serious and possibly fatal attack. He likens the condition to that of infection with tetanus bacilli. In that case antitoxin is of little use after the contractions develop, though reliable as a prophylactic.

Delirium tremens must be warded off by preventive measures. Its cure after development, especially in cases of trauma, is often impossible.

The procedures recommended are as follows:

1. Elimination of toxaemia by a brisk, drastic purge, calomel with jalap in dosage to suit the individual, probably 10 grains of calomel and 20 of compound powder of jalap. It should be followed by a good saline.

He also recommends high irrigation with saline solution, and abundant water taken by mouth to stimulate the kidneys.

2. Sleep should be enforced. Potassium bromide 20 grains with hyoscine hydrobromate 1-100 of a grain, repeated "after several hours" if necessary generally succeeds. The hyoscine should not be repeated if the patient is very weak. It may be given hypodermically if there is nausea. If the patient's heart is sound chloral with potassium bromide "produces the most natural sleep of all the narcotics."

The author condemns morphine but tentatively approves of apomorphine, and quotes the paper of Coleman and Polk in its favor.

To be used as a hypnotic it must be given hypodermically, about 1-30 of a grain or less, to be repeated in a short time if necessary.

If patients are very weak it should not be repeated. In two or three hours it may be followed by the chloral and bromide solution.

During an attack of delirium tremens morphine should never be given. It is not only useless but may have dangerous effects.

3. Cardiac stimulation is important in these cases of trauma threatened with delirium tremens. Strychnine, digitalis, and especially ergot are recommended. If the patient is a habitual user of alcohol the withdrawal should be gradual. Whiskey at such times is a necessary evil, for which strychnine is to be gradually substituted. The use of ergotin hypodermically three times a day for weeks is recommended very highly.

4. Nutrition must be maintained. Milk and Vichy, beef broths, eggs, and buttermilk, are useful.

5. The gastritis generally present must be alleviated. Lavage with hot water containing boric acid and soda is recommended.

Ten grain doses of pancreatin with twenty of bicarbonate of soda may be taken for nausea, or five grains of cerium oxalate with five to ten minims tincture of nux vomica as a tonic.

6. Necessary restraint by supervision and persuasion must be used instead of by physical or mechanical compulsion, which is injurious.

It should be remembered that these measures are all prophylactic, to be instituted in traumatic cases in patients addicted to drink They are intended to prevent the development of a condition which might result in insanity or death. Properly prescribed and

applied they will prevent almost every one of these cases from such deplorable results.

The article upon which these remarks are based is very comprehensive and explicit, and is worth reading by every doctor who is likely to meet with cases of severe injuries in persons much addicted to alcohol or narcotics.

REPORT OF CASE OF INTESTINAL INTUSSUSCEPTION.

Baby W., age 6 months, perfectly well and strong, breast fed, no history of digestive disturbance, had never taken medicine. At midnight had a sudden attack of colic with vomiting. Refused to nurse, no fever. Mother gave one teaspoon castor oil and ten drops paregoric. Colic continued during the rest of night. Bowels moved twice, both small yellow actions with good milk digestion, but with small streaks of fresh blood, no mucus or inflammatory products. Baby constantly uneasy, though no acute pain. Physical examination showed general abdominal tenderness, some rigidity and an ill-defined tumor was felt by deep depression in right ilioe fossa, rectal examination negative, temperature 99½. Considering the sudden onset, peculiar stool, constant pain, rigidity and tumor—diagnosis of intussusception was made; supported by Dr. Wood in consultation and confirmed by operation by Dr. Barr six hours after my first visit, who found three-inch ileum slipped through ileo-coecal valve. The intussusception was easily reduced—bowel congested but vitality good. Recovery uneventful. (*Selected.*)

GENESIS OF HYSTERICAL STATES IN CHILDHOOD

At the first congress of the American National Society for the Study of Exceptional Children, held in New York, April 20, 1910, Dr. Tom A. Williams, of Washington, read a paper with the above title, which merits more than passing attention. At the start he defines his understanding of the meaning of the word "hysteria" as "those symptoms susceptible of production by suggestion and of removal by suggestion—persuasion," giving (in note 4) as his authority "Williams," as expressed in an article published in the New Orleans Medical Journal, June, 1909.

This corresponds very closely with the definition suggested by Babinski who offered the term "pithianism" for hysteria, and the definition—"a condition of the body which renders the subject thereof capable of autosuggestion." Babinski elaborates his definition thus:

"It manifests itself principally by phenomena capable of being reproduced with rigorous exactitude by suggestion in certain subjects and of being made to disappear under the exclusive influence of persuasion; and also by strictly subordinated troubles."

This view is so divergent from the conception ordinarily held by the general practitioner that it is worthy of note. Suggestion is an element in therapeutics that is seldom employed or even thought of by the majority of doctors, and the name—hysteria—suggests only nerve sedatives. Yet when they consider the abnormally excitable condition of young children they all realize the power of the mind and the imagination over physical conditions during those tender years.

With this understanding let us glance at the conditions of mind, or the imagination which is an organ of the mind, which may properly, in his opinion, be classed as hysteria. The distinction between what one might call Babinski hysteria and physical hysteria can most easily be drawn by illustration, namely, a condition of the mind or nervous system caused by the pertubations incident to approaching puberty would not be considered hysterical. The night terrors caused by indigestion are not hysterical. The chorea of semi-rheumatic origin would not be considered phenomena of hysteria. But the uncontrolled movements of other school girls or boys who contract the choreic habits by seeing them, are hysteria, caused by suggestion and curable by suggestion.

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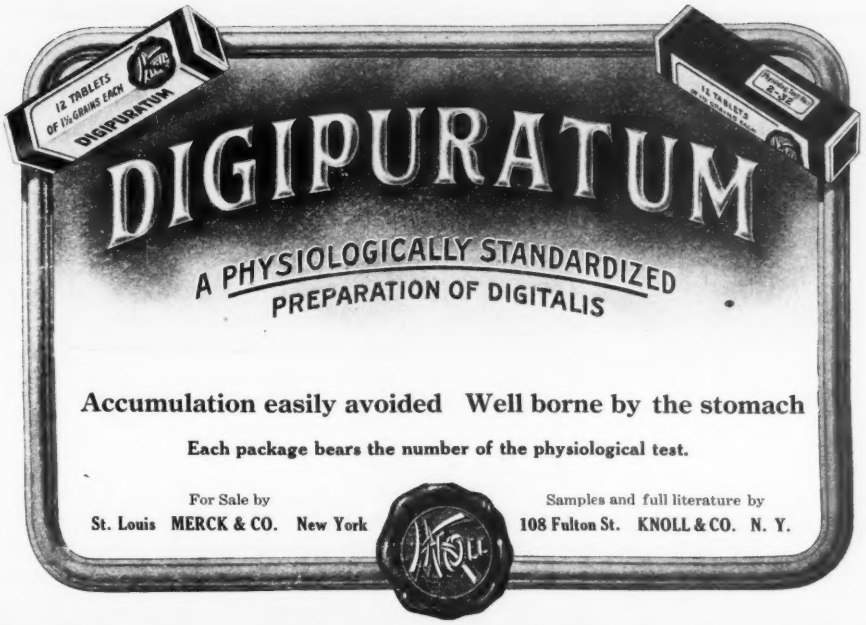
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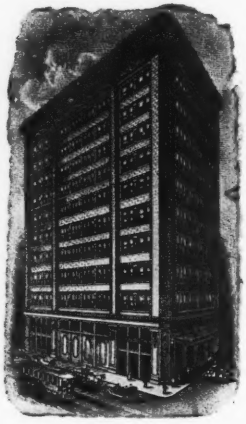

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Journal American Medical Association, January 22, 1910, Folio 261.

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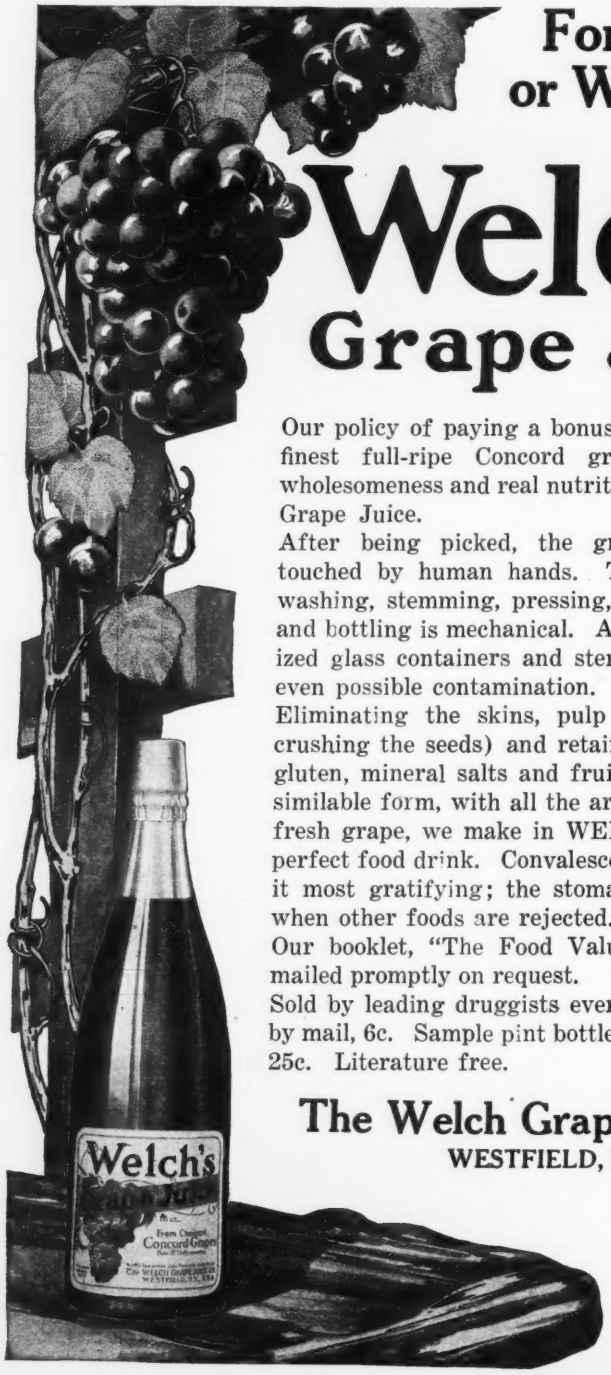

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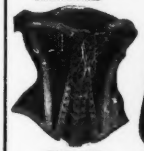
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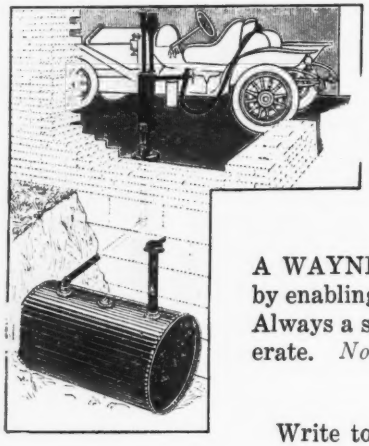

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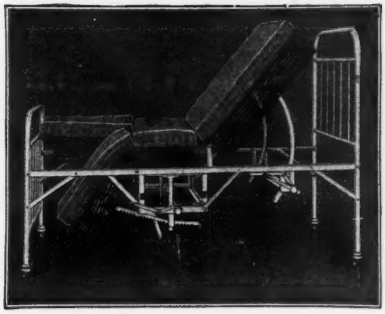

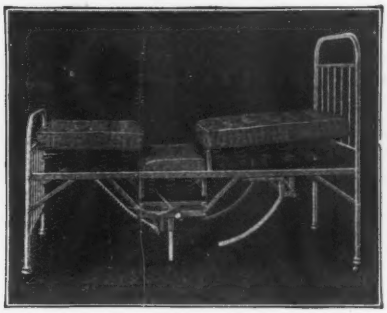

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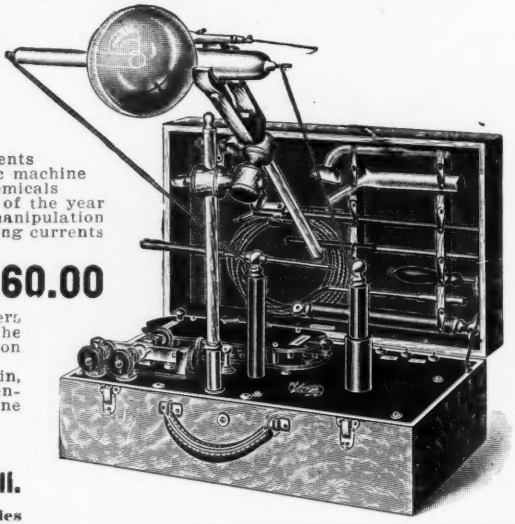

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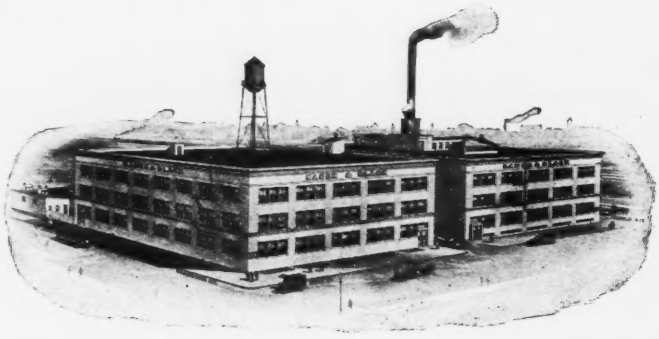

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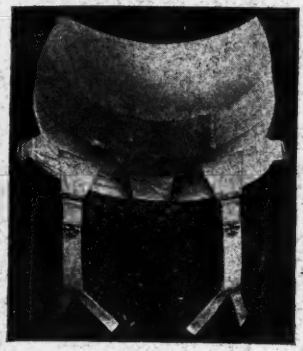

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